

June 19, 2015

Dr. Hannah Mathers
839 Riva Ridge Blvd
Gahanna, OH 43230
mathers326@gmail.com
614-371-0886

To whom it may concern,

My CV outlines my academic credentials and my training in weed control in ornamental crops, plant stress physiology and diagnoses of plant disorders. For 23 years, I have provided outreach to the nursery and landscape industries; professional societies; and federal, state and provincial agencies in the United States and Canada. I am presently employed as an Independent Researcher, Mathers Environmental Science Services, LLC conducting trials for chemical companies, Ohio and Michigan nurseries and Christmas tree plantations and USDA IR-4. Until Dec. 31, 2014, I was employed as a Tenured, Full Professor in the Department of Horticulture and Crop Science at Ohio State University (OSU), Columbus and the State Extension Specialist for Nursery and Landscape. Before OSU (prior to 09/2000), I was a Tenure Track, Assistant Professor at Oregon State University, North Willamette Research and Extension Center, Aurora, OR. For the past 18 years, I have distinguished myself in weed control in ornamental crops. I have conducted thousands of herbicide efficacy and phytotoxicity trials, invented five new bio-herbicides, assisted in the registration of seven new herbicides in the US nursery industry and become a notable speaker at national and international programs. As an independent researcher, I continue with nursery weed control including dormant applications and season-long programs. My CV also indicates my experience in working collaboratively and effectively and includes awards for excellence in service, dedication, teaching and diversity.

After high school and completion of two associate degrees, I worked four years as a Forest Nursery Technician with the Ontario Ministry of Natural Resources at the G. Howard Ferguson Forest Center (GHFFC). GHFFC in greenhouse, field and stool bed production of deciduous and coniferous seedlings and whips. Each year, I led different programs and obtained a solid background in all phases of greenhouse/ nursery production. My two associate degrees and technical level employment has enabled me to relate to greenhouse and nursery managers and implement relevant industry research throughout my career. After working at GHFFC, I completed my BSc in Plant Science at Cornell University, Ithaca, NY. At Cornell, I graduated on the Dean's List. In 1988, I completed my MSc in Horticulture at the University of Saskatchewan, specializing in cold stress physiology as a Les Kerr Scholar. I then conducted province-wide extension and research in nursery field and container crops as the Nursery Industry Specialist, first with Alberta Agriculture and then with the British Columbia Ministry of Agriculture. I completed my PhD in Horticulture from Michigan State University, East Lansing in December 1997 and worked in the USDA Stone Fruit Decline and viticulture programs (1990-1994). My background has awarded me expert knowledge of scientific theories, principles and practices related to woody plant production and optimum landscape material growth.

In my five professional positions, including my own company, I have obtained numerous grants, independently initiated research and published in scientific journals and other print formats. My communication skills are demonstrated by more than 270 out-of-state and out-of-country invited speaker presentations, 21 peer-reviewed journal articles (with another five in progress for journal publication) and over 100 trade articles. In Ohio, I served as Chair of the OSU Nursery Short Course and in Oregon, Chair of the Ornamental Northwest Seminar, developing the program and managing the budgets of these 2500 and 1600, respectively, industry attended, three day and nine concurrent tracks annual programs. At OSU, my CV lists over \$2.8 Million in extramural grants obtained in 14 years with only a 25% research appointment. These focused on five areas: nursery production of herbaceous and woody plants, nursery and landscape weed control; bio-chemical weed control; new nursery production technologies for improved highway right-of-way restoration and the interaction of cold stress with plant nutrition.

My weed research program emphasizes alternatives to synthetic chemical controls including bio-herbicides and bio-rational approaches with vascular and non-vascular (moss and liverworts) weeds. Currently, the five alleopathic plant extracts that I developed have obtained a provisional patent through the Ohio State University, Technology and Commercialization Office (TCO), and a material transfer agreement is in place until June 2015 with Scotts Co., Marysville, OH. My research and outreach experience and three core competencies of weed science in ornamental crop production, plant stress physiology and plant nutrition have enabled me to contribute significantly to the green industry throughout the US. My qualifications and work abilities have always meet or exceeded expectations. If you have any questions, I look forward to hearing from you, at your convenience.

Sincerely yours,

A handwritten signature in cursive script, appearing to read "Hannah Mathers".

Hannah Mathers, PhD
Independent Researcher
Mathers Environmental Science Services, LLC
839 Riva Ridge Blvd
Gahanna, OH; 43230



Curriculum Vitae

for

HANNAH MARY MATHERS

Mathers Environmental Science Services, LLC

839 Riva Ridge Blvd

Gahanna, OH

43230

614-371-0886

mathers326@gmail.com

CURRENT APPOINTMENT

- Independent Researcher and Consultant, Mathers Environmental Science Services, LLC, Gahanna, OH.

EDUCATION

Doctor of Philosophy

Cold Stress Physiology
Completed - December, 1997
Michigan State University/ East Lansing, MI
Dissertation: Evaluation of *Prunus cerasus* Germplasm for Cold Resistance

Duties of: **Graduate Research Assistant**

Title: **Laboratory Coordinator**

June 1990 to April 1993

Department of Horticulture

Michigan State University

East Lansing, MI

Stone Fruit Decline Program: Cold Hardiness Investigations

- Wrote and maintained laboratory budget for stone fruit decline grant
- Wrote reports and gave presentations, as requested, on laboratory functions and usage
- Designed, initiated, and maintained cold hardiness equipment
- Furnished and maintained experiment schedules for all laboratory users
- Provided both written and verbal technical support to laboratory users, including principles of experimental design, methodology, and data analyses
- Provided physical support to laboratory users including initiation, freezing and tear-down
- Supervised of laboratory staff
- Maintained experimental records and conducted data analyses

Master of Science

Horticulture - Stress Resistance Physiology
Completed: October 1988
University of Saskatchewan/ Saskatoon, SK
Thesis: Seedling Screen of *Malus* for Cold Resistance: Application in Inheritance

Bachelor of Science

Plant Science
Completed: June 1986
Cornell University/ Ithaca, NY
Other Research: Orchard Management in Eastern Ontario, Freeze Injury and Freezing Resistance in *Prunus persica*

Associate Diploma In Agriculture

Horticulture
Completed: April 1980
University of Guelph/ Guelph, Ontario
Specialization: Fruit and Vegetable Production

Forest Technician's Diploma

Forestry
Completed: June 1978
Sir Sandford Fleming College/ Lindsay, ON

EMPLOYMENT

Independent Researcher

Mathers Environmental Science Services
Part time: 06/2010 to 12/31/2014
Full time: 01/01/2015 to 12/31/2015
839 Riva Ridge Blvd
Gahanna, OH

Research Missions: 1) To reduce herbicide usage and cost via bio-rational and organic approaches, improve application technologies and timing of applications. 2) To increase efficiency, and investigating

long term impacts of cultural practices on carbon sequestration and runoff control in urban environments.
 3) To improve cold tolerance of hardiness values for roots and shoots of commonly container grown plants.

State Extension Specialist Nursery and Landscape Crops **Ohio State University**
 September 2000 to December 2014
 Horticulture and Crop Science
 2001 Fyffe Ct., Columbus, OH

- October 2013 to present. **Professor**, State Extension Specialist Nursery and Landscape, The Ohio State University, College of Food, Agriculture and Environmental Sciences (CFAES), Horticulture and Crop Science
- October 2005 to September 2013. **Associate Professor**, Extension Specialist Nursery and Landscape, The Ohio State University, CFAES, Horticulture and Crop Science
- September 2000 to September 2005. **Assistant Professor**, Extension Specialist Nursery and Landscape, The Ohio State University, CFAES, Department of Horticulture and Crop Science

My goal was to provide leadership statewide via the delivery of a nationally recognized extension (75% extension appointment) and applied research (25% research appointment) in nursery and landscape regarding ecologically sound cultural and best management practices for weed control and fertility, accelerated production systems, improved transplant survival, labor use efficiency and sustainable container cropping systems including plant hardiness and dormancy investigations. I have taught (0% teaching appointment) professional development classes for under- and graduate students in nursery and landscape operations and weed control in horticultural crops. From 2005 to 2014 (10 yr.), I was co-chair or chair of the Ohio State University Nursery Short Course (a four day, seven concurrent track, annual educational program with 2,500 attendees) which ran in conjunction with the Ohio Nursery and Landscape Association (ONLA) CEN Trade Show with 10,000 attendees in Columbus, OH.

Nursery Greenhouse Regional Extension Agent /Assistant Professor **Oregon State University**
 October, 1997 to September 2000
 North Willamette Research and Extension Center 10/ 1997
 15210 NE Miley Rd., Aurora, OR

Responsible for conducting regional based extension and educational activities, in a seven county area, representing 90% of the \$542 million dollar Oregon Nursery/ Greenhouse industry. Responsible for solving grower identified needs, evaluating soil, soil-less media and water tests, consulting on pest management and propagation, independently initiating research and writing in national and international trade magazines. Speak at national/international conferences on a wide range of topics in the nursery and greenhouse industries. Initiate, plan, organize, conduct and evaluate effective educational workshops and field days; and provided technical assistance for producers and industry affiliates. Conduct on site visits to growers to identify and solve their production problems and discuss research endeavors in one-on-one and seminar formats. Write and assemble the Joint OSU/ ODA Nursery Newsletter, the OSU Spanish Newsletter and numerous Nursery Industry Factsheets. Oversee, as chair, Ornamentals Northwest Seminars, with five concurrent sessions over three days in conjunction with the Far West Trade Show in Portland, OR, annually. Conduct several programs for new nursery and greenhouse growers, in and out-of-state. Co-ordinate a wide variety of applied research projects including trials diseases, weed control, fertilizer and container studies, cold tolerance investigations and *Pieris* breeding and genetics.

Provincial Nursery Crops Industry Specialist **British Columbia Ministry of Agriculture, Fisheries and Food**
 May 1994 to October 1997
 Abbotsford Agriculture Centre
 1767 Angus Campbell Road, Abbotsford, BC, Canada

Advise and lead the nursery industry (including growers and retailers), Ministry personnel, other extension agencies and agri-business on all phases of production, business management and marketing of nursery crops. This included consulting with nursery crop growers on farms, by telephone or in groups, on management techniques such as: identifying and controlling weed, insect, disease and nematode problems; assisting with the interpretation of soil and tissue analyses and recommendations; making recommendations concerning the safe use of pesticides; inspecting plantings for diagnoses of special problems; advising as to selection of species and varieties and their propagation, planting and care; advising as to new methods and techniques of husbandry, new structures and equipment, market opportunities and economic implications of the recommendations. Organized two industry short courses per year, field days for growers, landscapers, retailers, agri-business and other agencies. Identified information needs, evaluated research and conducted nursery crop trials for development and demonstration of technology. Organizes regional and Province-wide extension and industry development programs for transfer of technology to all sectors of the industry. Wrote factsheets as required, six trade journal articles and four newsletters per year, revised and edited the Nursery Production Guide. Represented the Ministry on technical committees at the regional, provincial and national levels. Administered specified regulations pursuant to the BC Plant Protection Act. Collated crop production and marketing data and developed forecasts. Supervised 2 staff.

**Nursery Industry
Specialist
Agriculture, Food and
Rural Development**

Alberta Specialty Crops and Horticultural Research Centre
May 1993 to May 1994
September 1988 to December 1989
Brooks, AB, Canada

Developed, implemented and administered applied research in production and utilization of woody, perennial and annual plants for outside plantings. Initiated container overwintering trials, evaluation trials of herbaceous perennials, dormancy and controlled acclimation studies, seedling screen and inheritance studies of woody ornamentals for cold resistance, and propagation studies evaluating growth regulators, fertility and etiolating. Coordinated extension activities concentrating on improving production economics and technology transfer through newsletters, short courses, publications in trade magazines and scientific journals. Provided technical information to staff in cities and towns and industry representatives. Provided leadership and training to technical staff members and up to ten casual employees. Supervised 2 staff.

HONORS AND AWARDS

- Meritorious Service Award. 2013. North Central District IR-4. US Department of Agriculture. Inter-regional 4 minor use program. For service supporting and advancing minor use registrations and the IR-4 program.
- Award of Merit. 2008. The Ohio Nursery and Landscape Association. For giving unselfishly of time, talent and resources to serve the association and, thus, the Green Industry in Ohio. Annual Convention.
- State Personnel Service Award in Agriculture and Natural Resources. 2007. The Ohio Association of Extension Professionals. Service as an Extension Specialist in Ohio.
- Bill Williams Diversity Award. 2007. The Ohio State University, College of Food Agriculture and Environmental Sciences. Outstanding efforts and accomplishments to diversity and inclusion.
- Dedication to Excellence. 2000. Delivery of nursery industry education as a producer of the Ornamentals Northwest Seminars from the Oregon Association of Nurserymen, Far West Show Committee.
- Oregon Association of Nurserymen Distinguished Education Award. 1999.
- British Columbia Nursery Trades Association Award for Dedicated Service, 1997.

EXTENSION AND CONTINUING EDUCATION INSTRUCTIONS

Extension and continuing education activities include providing production and management information and research results to industry and scientific audiences locally, regionally, nationally and internationally

at professional conferences, short courses, seminars, workshops, field tours, via internet and direct consultations.

- I have organized and chaired 43 national/ international workshops, or seminars and short courses for approximately 23,744 clients, 4 were out-of-country. In addition, I organized and guided 16 field days or bus tours to approximately 685 clients, 2 were out-of-country (see summary table below) (A detailed listing is available on request).

Category	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total	Av.
A.	4	7	6	7	3	4	1	2	3	3	43	4.3
Workshop, Seminars and Short Courses												
Number of Participants	345	3898	3622	3266	2097	2164	2000	2067	2100	2085	23,734	2373
B. Field Days and Bus Tours	2	1	1	---	1	3	4	2	2	N/A	16	1.8
Number of Participants	105	55	25	---	55	285	134	75	26	N/A	685	7.0

- I have delivered 381 (180 in-state) presentations. 55% of these 381 (213) presentations were out-of-state (78% invited) to 20,526 clients in 27 states, 17% of these were out-of-country (100% invited) in five Canadian provinces and three other countries (Denmark, England and Germany). 45% (180) were in-state presentations (72% invited) to 22,726 clients (see summary table below) (A detailed listing is available on request).

Category	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total	Av.
List of Extension Presentations	12	12	16	34	34	27	30	12	21	15	213	21
Out-of-State Number of Participants	1230	887	2958	2964	3955	2440	1592	1200	2100	1200	20526	2052
Number out- of-country	0	0	2	5	9	8	6	--	2	4	36	4
% Invited	67%	56%	44%	62%	76%	90%	80%	100%	100%	90%		78%
List of Extension Presentations In-State	15	27	15	20	13	9	23	26	16	16	180	18
Number of Participants	1465	2739	1590	1900	932	400	4500	5200	3200	1000	23726	2372
Invited %	100%	89%	73%	60%	20%	60%	80%	81%	80%	100%		74%

i) Invited Presentations (past 2 years):

International

- Mathers, H.M. 2014. Question and Answers with Hannah. 2014 IQDHO to 40 Quebec industry members. Drummondville, Quebec, Canada (January 31).
- Mathers, H.M. 2014. Dirty Deeds Done Dirt Cheap: Container Weed Control. 2014 IQDHO to 110 Quebec industry members. Drummondville, Quebec, Canada (January 30).

3. Mathers, H.M. 2014. Your Trees on Crack: Reasons for Bark Cracking. 2014 IQDHO to 110 Quebec industry members. Drummondville, Quebec, Canada (January 30).
4. Mathers, H.M. 2014. Mode of Action of Herbicides for Ornamental Crop Production. 2014 IQDHO to 110 Quebec industry members. Drummondville, Quebec, Canada (January 30).
5. Mathers, H.M. 2013. What the World Needs Now: Improving Urban Tree Survival. Presented at Landscape Ontario Congress to 90 industry members. Toronto, ON, Canada. (January 8).
6. Mathers, H.M. 2013. Going Greener: Bioherbicides for Landscape Weed Control. Presented at Landscape Ontario Congress to 220 industry members. Toronto, ON, Canada. (January 7).

National

1. Mathers, H.M. 2014. Sustainable Nursery and Landscape Practices. ONLA's Central Environmental Nursery Trade Show and OSU Nursery Short Course Bioplastics Container Cropping Systems Workshop. 50 industry members. Columbus, OH. (January 12).
2. Mathers, H.M. 2014. Understanding Landscape Sustainability. Presented at ONLA's Central Environmental Nursery Trade Show and OSU Nursery Short Course to 200 industry members. Columbus, OH. (January 14).
3. Mathers, H.M. 2014. Weeds Just Want to Have Fun. Presented at ONLA's Central Environmental Nursery Trade Show and OSU Nursery Short Course to 130 industry members. Columbus, OH. (January 14).
4. Mathers, H.M. 2014. Dirty Deeds Done Dirt Cheaper: CORE, Insecticides, Fungicides and Herbicide MoA's. Presented at ONLA's Central Environmental Nursery Trade Show and OSU Nursery Short Course to 200 industry members. Columbus, OH. (January 13).
5. Mathers, H.M. 2013. Landscape Weed Control, Strategies & BMPs. Ohio Turfgrass Foundation (OTF). Columbus, OH (Dec. 04, 2013).
6. Mathers, H.M. 2013. Born to be Wild: Controlling Landscape Weeds, Strategies & BMPs. Ohio Turfgrass Foundation (OTF). Columbus, OH (Dec. 03, 2013).
7. Mathers, H.M. 2013. Weed Identification of Nursery Containers and Landscapes. Presented at OFA Short Course and Expo to 60 industry members. Vancouver, WA. (Sept. 11).
8. Mathers, H.M. 2013. Weed Control Nursery Fields. Presented at OFA Short Course and Expo to 40 industry members. Vancouver, WA. (Sept. 11).
9. Mathers, H.M. 2013. Identification of Nursery Weeds. Presented at OFA Short Course and Expo to 65 industry members. Columbus, OH. (July 13).
10. Mathers, H.M. 2013. Weed Control in Field Grown Nursery Production. Presented at OFA Short Course and Expo to 40 industry members. Columbus, OH. (July 14).
11. Mathers, H.M. 2013. Dirty Deeds Done Dirt Cheap-er. Presented at Oregon Association of Nurseries' FarWest Show Seminars to 278 industry members. Portland, OR. (August 23).
12. Mathers, H.M. 2013. Lifestyles of Famous: The Top 10. Presented at New England Grows to 1,800 industry members. Boston, MA. (February 07).

13. Bigger, M. and Mathers, H.M. 2013. Incorporating urban forests into the landscape. Presented at ONLA's Central Environmental Nursery Trade Show and OSU Nursery Short Course to 200 industry members. Columbus, OH. (January 14).
14. Mathers, H.M. 2013. 10 Most Unwanted: Landscape Weed Control. Presented at ONLA's Central Environmental Nursery Trade Show and OSU Nursery Short Course to 200 industry members. Columbus, OH. (January 14).
15. Mathers, H.M. 2013. What's New in Nursery Field and Container Weed Control? Presented at ONLA's Central Environmental Nursery Trade Show and OSU Nursery Short Course to 200 industry members. Columbus, OH. (January 15).

Regional (Multi-state)

1. Mathers, H.M. 2014. Restoring Woodlands to the Urban Landscape. Tri-State Green Industry Conference. Cincinnati, OH. Presented to 90 attendees (Feb. 6, 2014).
2. Mathers, H.M. 2014. Landscape Weed Control. Tri-State Green Industry Conference. Cincinnati, OH. Presented to 90 attendees (Feb. 6, 2014).
3. Mathers, H.M. 2014. Weeds Just Want to Have Fun. Pesticide Recertification Program. Chesapeake Green. Maryland Nursery and Landscape Association. Linthicum, MA. Presented to 100 attendees (Feb. 21, 2014).
4. Mathers, H.M. 2013. Sustainable Landscape Weed Control. Pesticide Recertification Program. Chesapeake Green. Maryland Nursery and Landscape Association. Linthicum, MA. Presented to 100 attendees (Feb. 21, 2014).
5. Mathers, H.M. 2013. Weed Identification Nursery and Landscape. MI Macomb Co, Pesticide Recertification Program. Macomb Co., MI. (Dec. 16, 2013).
6. Mathers, H.M. 2013. Herbicide Injury. MI Macomb Co, Pesticide Recertification Program. Macomb Co., MI. (Dec. 16, 2013).
7. Mathers, H.M. 2013. Herbicide Treated Mulch. MI Macomb Co, Pesticide Recertification Program. Macomb Co., MI. (Dec. 16, 2013).
8. Mathers, H.M. 2103. Born to be Wild: Controlling Landscape Weeds, Strategies & BMPs. MI Macomb Co, Pesticide Recertification Program. Macomb Co., MI. (Dec. 16, 2013).
9. Mathers, H.M. 2013. Weed Identification Nursery and Landscape. Presented at 27th Annual Summer Field Day to industry members. Danville, IN. (August 22).
10. Mathers, H.M. 2013. Sustainable Landscape Weed Management. Presented at 27th Annual Summer Field Day to industry members. Danville, IN. (August 23).
11. Mathers, H.M. 2013. Nursery field weed control. Presented at MSUE – West MI Weed Workshop. West Olive, MI. (February 29).
12. Mathers, H.M. 2013. Alternative ornamental weed control. Presented at MSUE – West MI Weed Workshop. West Olive, MI. (February 29).
13. Mathers, H.M. 2013. Container weeds control. Presented at MSUE – East MI Weed Workshop. Ann Arbor, MI. (February 29).

14. Mathers, H.M. 2013. Famous Landscape Weeds. Presented at MD, DC, and VA Landscape Contractors Association's Pesticide Recertification Conference to 325 industry members. Chevy Chase, MD. (February 14).
 15. Mathers, H.M. 2013. Herbicide Mode of Action. Presented at MD, DC, and VA Landscape Contractors Association's Pesticide Recertification Conference to 325 industry members. Chevy Chase, MD. (February 14).
 16. Bigger, M. and Mathers, H.M. 2013. Current environmental concerns, tree stress and sustainability. Tri-State Green Industry Conference. Sharonville, OH. (Feb. 7)
 17. Mathers, H.M. 2013. Alternative Weed Control. Indiana Green Expo. Indianapolis, IN. (Jan. 10).
 18. Mathers, H.M. 2013. Container Weed Control. Indiana Green Expo. Indianapolis, IN. (Jan. 10).
- ii) Other Presentations (Scientific meetings)

National

1. Mathers, H. 2015. Herbicide Trials Ohio. NE Weed Science Society. VA
2. Mathers, H. 2013. Herbicide Trials Ohio. NE Weed Science Society. Baltimore, MD (February 6).
3. Mathers, H. and L. Case. 2013. Liverwort Trials MI. NE Weed Science Society. Baltimore, MD (February 6).
50% Contributor to Research Associate Presentation.
4. Bigger, M. and H. Mathers. 2013. Greening the highways: Outplant survival of deciduous trees in stressful environments. Horticulture and Crop Science Graduate Research Retreat. Columbus OH. 35% Contributor to Graduate Student Presentation
5. Mathers, H.M. & M.M. Bigger. 2013. Ornamental weed control with bio-herbicides and bio-rational approaches. Poster. Northeastern Weed Science Society annual meeting. Baltimore, MD. Feb. 4-7. 70% Contributor along with Graduate Student assistance
6. Bigger, M & H. Mathers. 2013. Greening the highways: 401 & Allen Road. Presentation. Urban Tree Growth & Longevity Working Group Field Trip. Toronto, Ontario Canada. August 13. 35% Contributor to Graduate Student Presentation

RESEARCH PUBLICATIONS

Published Work Type	Sub-Category	Number of Publications
Chapters in Edited Books		1
Bulletins, Technical Reports and Factsheets	Production Guides and Manuals	2
	Circular Articles	2
	Fact Sheets	4
	Technical Reports	14
	Contributed Technical Reports	70
Peer-Reviewed Journal Articles		21
Abstracts and Short Entries		43
Papers in Proceedings		33
Unpublished scholarly presentations	Invited - International	36

	Invited - National	63
	Invited - Regional	91
	Invited-State	82
	Other - National	67
Potential publications under review		5
Trade Publications		82
	Total	616

i) Production Guides and Manuals

1. Mathers, H.M. and Case, L.T. 2014. Weed Control in Ohio Christmas tree Plantations. Pp. 31-44. *In: Ohio Christmas tree Producers Manual. Bulletin 670. Ohio State University Extension. CFAES. Pp. 1-100.*
2. Mathers. H. Author Chapter 12. 2011. Weed Management. Michigan Certified Landscape Contractor Manual. Certified Green Industry Professional (CGIP) Committee. Michigan Nursery and Landscape Association.

ii) Technical Reports

1. Mathers, H. M. and K. Daniel. 2015. Effects from germination to field. Buckeye. Educational Update. The Buckeye. Vol. 26 (1):13-21.
2. Mathers, H. M. 2013. Improving your landscape nursery weed control. Buckeye. Educational Update. The Buckeye. May. Pp. 1-8.
3. Mathers, H. M., Case, L. T., Emerick, J., Ramirez, G, Bigger, M., and Gordon, P. 2013. Yearly research summary report 2013. Ornamental Research. Pp. 1-85 (8 articles)
<http://basicgreen.osu.edu/research-summary-reports>
4. Mathers, H. M., Case, L. T., Bigger, M., Gordon, P., Giese, L. and Holdren D. 2012. Yearly research summary report 2012. Ornamental Research. Pp. 1-109. (10 articles)
basicgreen.osu.edu/research-summary-report
5. Mathers, H. M., Case, L. T., Daniel, K., Bigger, M., and Gordon, P. 2011. Yearly research summary report 2011. Ornamental Research. Pp. 1-109. <http://basicgreen.osu.edu/research-summary-reports>
6. Mathers, H. M., Case, L. T., Daniel, K., Sage, L. and Rivera, D. 2010. Yearly research summary report 2010. Ornamental Research. Pp. 1-109. <http://basicgreen.osu.edu/research-summary-reports>
7. Mathers, H. M., Case, L. T., D.K. Struve, D. Rivera, S.E. Svenson and R. H. Zondag. 2009. Retractable roof greenhouse (RRG) versus bareroot tree liner post-harvest survival and growth in nursery production. The Buckeye 20(6): 1-8. June Educational Update.
8. Mathers, H. M., Case, L. T., Daniel, K., Somireddy, U., Rivera, D. and J. Parrish. 2009. Yearly research summary report 2009 Ornamental Research. Pp. 1-50.
<http://basicgreen.osu.edu/research-summary-reports>
9. Mathers, H. M., Case, L. T., Daniel, K., Somireddy, U., and Rivera, D. 2008. Yearly research summary report 2008 Ornamental Research. <http://basicgreen.osu.edu/research-summary-reports>

10. Mathers, H. M., and Acuna, A. 2008. Multistate survey of nursery workforce: OH, MI, DE, TN, FL, IN, KY, and RI. June Educational Update. The Buckeye. June. Pp. 1-8.
<http://basicgreen.osu.edu/research-summary-reports>
11. Mathers, H. M., Case, L. T., Daniel, K., and Somireddy, U., Rivera, D. 2007. Annual research summary report 2007 Ornamental Research. <http://basicgreen.osu.edu/research-summary-reports>
12. Mathers, H. M., and Acuna, A. 2007. Implementing and assessing an onsite bilingual education program for Hispanic nursery workers in Ohio. June Educational Update. The Buckeye. June. Pp. 1-8.
13. Mathers, H. M., Case, L. T., 2006. Annual research summary report 2006 Ornamental Research. <http://basicgreen.osu.edu/research-summary-reports>
14. Mathers, H. M., T. Yeager and L.T. Case. 2006. Improving irrigation water use in container nurseries. June Educational Update. The Buckeye. June. Pp. 1-8.
15. Mathers, H. M., A. Stoven, D. Struve, E. Grosskurth and L.T. Case. 2005. Tree Liner production in retractable roof greenhouses (RRG'S) June Educational Update. The Buckeye. September Pp. 1-8.

iii) Peer-Reviewed Journal Articles

1. Alejandra A. Acuña, Hannah M. Mathers, Donna R. Long, Bridget K. Behe, A. W. Hodges, U. K. Schuch, S. S. Barton, J. H. Dennis, B. K. Maynard, C. R. Hall . 201x. Demographic Characteristics of the nursery industry labor force: OH, MI, DE, TN, FL, IN, KY, and RI. HortScience. Accepted.
2. Jiang, L., Dami, I., Mathers, H.M., Dick, W.A. and Doohan, D. 2011. The effect of straw mulch on simulated simazine leaching and runoff. Weed Sci. 59:4 580-586.
3. Mathers, H.M., Case, L.T., Struve, D.K., Rivera, D., Svenson, S.E. and Zondag, R. 2010. Growth acceleration and increased outplant survival of Ontario and Ohio tree liners. Acta Hort. (ISHS) 880:243-252. (Note: this is a peer reviewed journal – see <http://www.ishs.org/acta/>).
4. Mathers, H. M. and Case, L.T. 2010. Microencapsulated herbicide treated bark mulches for nursery container weed control. Weed Technology. 24(4):529-537.
5. Mathers, H.M., A. Acuna, D. Long, B.K. Behe, A.W. Hodges, J.J. Haydu, U.K. Schuch, S.S. Barton, J.H. Dennis, B.K. Maynard, C.R. Hall, R. McNeil, and T. Archer. 2010. Nursery worker turnover and language proficiency. HortScience 45(1):1-7.
6. Acuna, A., and Mathers, H. M. 2009. Implementing and assessing an onsite bilingual educational program for Hispanic nursery workers in Ohio. Journal of Environmental Horticulture 27(1):91-98.
7. Samatani, J. B., Kling, G. J., Mathers, H. M., and Case, L. T. 2007. Rice hulls, leaf-waste pellets and pine bark as herbicide carriers for container-grown woody ornamentals. HortTechnology. 17:289-295.
8. Mathers, H. M., Lowe, S. B., Scagel, C., Struve, D. K., and Case, L. T. 2007. Abiotic factors influencing root growth of woody nursery plants in containers. HortTechnology. 17:151-162.
9. Case, L. T., and Mathers, H. M. 2006. Herbicide treated mulches for weed control in ornamentals.

Journal of Environmental Horticulture 24:84-90.

10. Stoven, A.A., H.M. Mathers, D.K. Struve. 2006. Fertilizer application method affects growth, nutrient and water use efficiency of container-grown shade tree whips. *HortScience* 41:1-7.
11. Case, L.T., H.M. Mathers and A. F. Senesac. 2005. A review of weed control practices in container nurseries. *HortTechnology* 15(3):535-545.
12. Mathers, H. M., and Stushnoff, C. 2005. Screening *Malus* seedlings for cold resistance. *HortScience* 40:318-322.
13. Mathers, H. M., Yeager, T. and Case, L. T. 2005. Improving irrigation water use in container nurseries. *HortTechnology* 15(1):8-12.
14. Struve, D. K., Starbuck, C., and Mathers, H. M. 2005. Transplanting Red Oak using the Missouri gravel bed system. *HortTechnology* 15(1): 122-127.
15. Mathers, H. M. 2004. Supercooling and cold hardiness in Sour Cherry germplasm: Flower Buds. *Journal of Amer. Soc. Hort.* 129(5):682-689. (50% Ohio).
16. Mathers, H. M. 2004. Supercooling and cold hardiness in Sour Cherry germplasm: Vegetative Tissue. *Journal of Amer. Soc. Hort.* 129(5): 675-681. (50% Ohio).
17. Beeson, R. C., Arnold, M. A., Bilderback, T. E., Bolusky, B., Chandler, S., Gramling, H. M., Lea-Cox, J., Harris, J. R., Klinger, P. J., Mathers, H. M., Ruter, J. M., and Yeager, T. H. 2004. Strategic vision of container nursery irrigation for the next ten years. *Journal of Environmental Horticulture* 22(2):113-115. (100% Ohio).
18. Mathers, H. M., 2003. Technical information requested for Hispanic nursery employees - Survey results from Oregon and Ohio. *Journal of Environmental Horticulture* 21(4):184-189. (70% Ohio and 30% Oregon).
19. Mathers, H.M., 2003. Summary of temperature stress issues in nursery containers and current methods of protection. *HortTechnology* 13(4):617-624. (100% Ohio).
20. Mathers, H.M. 2003. Novel weed control methods in containers. *HortTechnology* 13(1):28-34. (65% Ohio, 35% Oregon).
21. Mathers, H.M. and Quamme, H.A. and Brownlee, R.T. 1991. A procedure for converting an ultra-low temperature freezer for biological material. *Can. J. Plant Sci.* 71:1281-1283. (85% contribution; wrote paper 100% and 20% procedure development).

iv) Potential Publications Under Review

1. Gordon, P.E., H.M. Mathers. 201x. Tree planting in stressful roadway sites: Benefits and limitations. Submitted to *HortTechnology* 11/2014.
2. K.M. Daniel, H.M. Mathers, L. Giese, J.C. Cocuron, A.P. Alonso, N.J. Taylor, G. Ramirez-Rosales and J.A. Beaver. 201x. The role of glyphosate, shikimic acid and wounding on thin-barked deciduous tree bark cracking. *HortScience* submission. 85% Authorship: Original concept, lead author of this paper, 90% of literature review.
2. H.M. Mathers and M.M. Bigger. 201x. Root dormancy, hardiness and overwintering woody ornamental container plants. *HortTechnology* manuscript #02350 assigned.

3. Case, L.T. and H.M. Mathers. 201x. Herbicide and mulch combinations for weed control in the landscape and field nurseries. Weed Technology WT-S-12-00139. 45% Authorship, applied for grant, principle investigator, editing 35%.
4. H.M. Mathers, K.M. Daniel. 201X. The long-term effects of successive planting depths from germination to container to field for survival and growth of two oak species. Native Plant Journal submission.
5. H. M. Mathers. 201x. Bio-herbicides for landscape and field nursery weed control. Weed Technology submission.

CREATIVE WORKS PERTINENT TO PROFESSIONAL FOCUS

i) Inventions and patents, including disclosures, option, and commercial licenses

1. Bio-herbicide Treated Mulch. 2013. The Ohio State University, Technology Commercialization & Knowledge Transfer. Invention Disclosure (IVD): #2013-036.

Provisional patent filed March 2014.

2. K-Bicarbonate and Na-Bicarbonate for Control of Liverwort in Nurseries, Greenhouses and Putting Greens. 2013. Technology Commercialization & Knowledge Transfer. Invention Disclosure (IVD): #2013-037.
3. Herbicide Impregnated Bark Nuggets. 2001. The Ohio State University, Office for Technology Licensing. Invention Disclosure: #01ID58F. (Although submitted in 2001, IVD is mentioned here since it leads to IVD #2013-036).

RESEARCH FUNDING

- In the past 14 years at OSU, I have obtained over \$2.8 Mn for OSU projects, with 184 grant submissions and a 25% research appointment. One area of strong support has been from the industry as in-kind contributions and gift awards for close to \$1 Mn in a 14 yr. period. (A detailed listing of all grants is available on request).

Funding Category	# of Proposals 2005-2014	A. Dollar Value 2005-2014	# of Proposals 2004-2000	B. Dollar Value 2005-2014	C. Total 2000-2014
Research Proposals Funded – Principal Investigator	37	\$1,137,113	10	\$146,996.00	\$1,284,109
Research Proposals Funded – Co-Principal Investigator	7	\$2,362,139 OH = \$421,910	4	\$89,343 OH = \$89,343	\$2,451,482 OH = \$511,253
Research Proposals Not Funded – Principal Investigator	19	\$4,701,369*	7	\$1,949,831	\$6,651,200
Funded Training Grants	1	\$7,500	2	\$18,782	\$26,242

Other Funding – Non – competitive	70	\$821,040	27	\$169,861	\$990,901
Total Funded Grants	134	\$4,327,792	50	\$424,982	\$4,752,774 (a + b = c)
		OH= \$2,387,563		\$424,982	\$2,812,545 (a + b = c)
				Grand Total 14 Years: \$2,812,545	

i) *Recent Funded Research Proposals (of note):*

1. Mathers, H. M. 2014. Ohio department of agriculture, Specialty Crop Block Grant Program-Farm Bill. Root hardiness and fertility. \$28,000.00. 09/ 2014 to 07/2016. Funding Success Ratio: 10%.
2. Mathers, H. M. 2012. Ohio department of agriculture, Specialty Crop Block Grant Program-Farm Bill. Major Weed Control Issues in Ohio Nurseries and Christmas tree Plantations. \$50,000.00. 11/ 2012 to 12/2013. Funding Success Ratio: 10%.
3. Mathers, H. M. 2012. Michigan department of agriculture, Specialty Crop Block Grant Program-Farm Bill. Addressing foremost weed control issues for the Michigan nursery and landscape industries. \$54,000.00. 10/ 2012 to 12/2013. Funding Success Ratio: <1%.
3. Mathers, H. M. 2012. Efficacy of liverwort controls and phytotoxicity of selected new herbicides to containerized nursery stock in Ohio and MI: The IR-4 Program in 2012. USDA/ IR-4. \$25,000. End 07/31/13.
4. Graves, W. Grewell, D., Kratsch, H., Larock, R., Stewart, R., Mathers, H., Ward, R. 2011-2016. BioPlastic container cropping systems: Green technology for the green industry. USDA-NIFA/Specialty Crop Research Initiative. \$ 1,900,000.00 (\$239,410.00 – Dr. Mather's portion). 20% Success rate.
20% Authorship, wrote extension outreach activities and budget.

Research Publication - Books (Other than Edited Volumes) and Monographs

a) *Bulletins, Technical Reports, Factsheets*

i) Production Guides and Manuals

1. Mathers, H.M. and Case, L.T. 2013. Chapter Weed Control in Christmas tree Plantations. Ohio Christmas tree Production Guide. Ohio State University.
2. Mathers. H. Author Chapter 12. 2011. Weed Management. Michigan Certified Landscape Contractor Manual. Certified Green Industry Professional (CGIP) Committee. Michigan Nursery and Landscape Association.

ii) Circular Articles

1. Mathers, H. M. and L.T. Case. 2005. Field evaluation of various herbicide and mulch combinations for ornamental weed control. Ornamental Plants Annual Reports and Research Reviews 2005. Special Circular 197:125-128. Peer Reviewed.
70% Authorship: I was the lead author for this circular, wrote the grant and analyzed the data.
2. Mathers, H. M., L.T. Case, E.S. Grosskurth and M.M. Bigger. 2005. Field caliper tree production using retractable roof greenhouse-grown liners. Ornamental Annual Reports and Research Reviews

2005. Special Circular 197:129-132. Peer Reviewed.

40% Authorship: I was the lead author for this circular, wrote the grant, and analyzed the data.

iii) Technical Reports

1. Mathers, H. M., Case, L. T., Emerick, J., Ramirez, G, Bigger, M., and Gordon, P. 2013. Yearly research summary report 2013. Ornamental Research. Pp. 1-85 (8 articles)
<http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
75% Authorship: I was the lead author of this summary and wrote the majority of the articles.
2. Mathers, H. M., Case, L. T., Bigger, M., Gordon, P., Giese, L. and Holdren D. 2012. Yearly research summary report 2012. Ornamental Research. Pp. 1-109. (10 articles)
<http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
55% Authorship: I was the lead author of this summary.
3. Mathers, H. M., Case, L. T., Daniel, K., Bigger, M., and Gordon, P. 2011. Yearly research summary report 2011. Ornamental Research. Pp. 1-109.
<http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
45% Authorship: I was the lead author of this summary.
4. Mathers, H. M., Case, L. T., Daniel, K., Sage, L. and Rivera, D. 2010. Yearly research summary report 2010. Ornamental Research. Pp. 1-109.
<http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
55% Authorship: I was the lead author of this summary.
5. Mathers, H. M., Case, L. T., D.K. Struve, D. Rivera, S.E. Svenson and R. H. Zondag. 2009. Retractable roof greenhouse (RRG) versus bareroot tree liner post-harvest survival and growth in nursery production. The Buckeye 20(6): 1-8. June Educational Update.
40 % Authorship: I was the lead author of this technical report and I analyzed the data.
6. Mathers, H. M., Case, L. T., Daniel, K., Somireddy, U., Rivera, D. and J. Parrish. 2009. Yearly research summary report 2009 Ornamental Research. Pp. 1-50.
<http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
60% Authorship: I was the lead author of this technical report.
7. Mathers, H. M., Case, L. T., Daniel, K., Somireddy, U., and Rivera, D. 2008. Yearly research summary report 2008 Ornamental Research. <http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
70% Authorship: I was the principal investigator and I was the lead author of this technical report.
8. Mathers, H. M., and Acuna, A. 2008. Multistate survey of nursery workforce: OH, MI, DE, TN, FL, IN, KY, and RI. June Educational Update. The Buckeye. June. Pp. 1-8.
40% Authorship: I wrote the grant, had the original concept and was the lead author of this technical report.
9. Mathers, H. M., Case, L. T., Daniel, K., and Somireddy, U., Rivera, D. 2007. Annual research summary report 2007 Ornamental Research. <http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
45% Authorship: I was the lead author of this summary report.
10. Mathers, H. M., and Acuna, A. 2007. Implementing and assessing an onsite bilingual education program for Hispanic nursery workers in Ohio. June Educational Update. The Buckeye. June. Pp. 1-8.
40% Authorship: I had the original concept and was the lead author of this technical report.

11. Mathers, H. M., Case, L. T., 2006. Annual research summary report 2006 Ornamental Research. <http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
65% Authorship: I was the source of the grant and the principal investigator.
12. Mathers, H. M., T. Yeager and L.T. Case. 2006. Improving irrigation water use in container nurseries. June Educational Update. The Buckeye. June. Pp. 1-8.
60% Authorship: I was the originator of the article and of the grant.
13. Mathers, H. M., A. Stoven, D. Struve, E. Grosskurth and L.T. Case. 2005. Tree Liner production in retractable roof greenhouses (RRG'S) June Educational Update. The Buckeye. September Pp. 1-8.
65% Authorship: Lead concept and design and authorship.

iv) Contributed Articles in Technical Reports

1. Mathers, H. M., Case, L. T. and Emerick, J. 2013. Weed Control in Specialized and Traditional Michigan Nurseries. Yearly research summary report 2013 pp. 42.
<http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
75% Authorship: I was the source of the grant and the principal investigator. I wrote the report.
2. Mathers, H. M., Case, L. T., Emerick, J. and Ramirez, G. 2013. Major Weed Control Issues in Ohio Nurseries. Yearly research summary report 2013 pp. 40.
<http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
85% Authorship: I was the source of the grant and the principal investigator. I wrote the report and conducted the majority of the evaluations.
3. Mathers, H. M., Case, L. T., Emerick, J. and Ramirez, G. 2013. Specticle G for Landscape Ornamental Bed Use Compared to Snapshot and FreeHand. Yearly research summary report 2013 pp. 5 <http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
60% Authorship: I was the source of the grant and the principal investigator. I wrote the report.
4. Mathers, H. M., Case, L. T., and Ramirez, G. 2013. Comparison of Specticle G vs. Marengo G in Containerized Ornamentals. Yearly research summary report 2013 pp. 6.
<http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
60% Authorship: I was the source of the grant and the principal investigator. I wrote the report.
5. Mathers, H. M., Case, L. T. 2013. Evaluation of Indaziflam for weed control and phytotoxicity. Yearly research summary report 2013. Pp.6. <http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
65% Authorship: I was the source of the grant and the principal investigator. I wrote the report.
6. Mathers, H. M., Case, L. T. and Emerick, J. 2013. Evaluation of Valent USA, V-10366 76WG in field trees and shrubs at various Ohio nurseries. Yearly research summary report 2013 pp. 10.
<http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
45% Authorship: I was the source of the grant and the principal investigator.
7. Mathers, H., Ramirez G. and Case. L. 2013. Evaluation of various bio-plastic one- gallon containers for impact of the nursery environment on the pot durability, appearance and for the pot's influence on plant growth. Yearly research summary report 2013 pp. 10.
<http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
75% Authorship: I was the source of the grant and the principal investigator. I wrote the report.
8. Mathers, H. 2013. Weed Control with Bio-herbicides. Yearly research summary report 2013 pp.

10. <http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
9. Mathers, H. M., Case, L. T., 2012. State-wide Weed Control Initiative for Ohio Nurseries. Yearly research summary report 2012. <http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
65% Authorship: I was the source of the grant and the principal investigator.
10. Mathers, H. M., Case, L. T., 2012. Evaluation of Indaziflam for weed control. Yearly research summary report 2012. <http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
65% Authorship: I was the source of the grant and the principal investigator.
11. Mathers, H. M., Case, L. T., 2012. Phytotoxicity and efficacy of several products to control liverwort in three propagation environments in Michigan. Yearly research summary report 2012. <http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
65% Authorship: I was the source of the grant and the principal investigator.
12. Mathers, H. M., Case, L. T., 2012. Phytotoxicity of several weed control products to containerized and field grown plants at three Michigan nurseries. Yearly research summary report 2012. <http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
65% Authorship: I was the source of the grant and the principal investigator.
13. Bigger, M.M. and Mathers, H. M. 2012. Greening the highways: Out-plant survival of deciduous trees in stressful environments. Toronto and Gahanna. Yearly research summary report 2012. <http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
30% Authorship: I was the source of the grant, the principal investigator and lead author of the report.
14. Gordon, P., and Mathers, H. M. 2012. Midwestern tree liner production with technologies new to the nursery industry. Yearly research summary report 2012. <http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
30% Authorship: I was the source of the grant, the principal investigator and lead author of the report.
15. Giese, L. and Mathers, H.M. 2012. The Impact of Glyphosate Overspray on the Bark of Green Bark Trees. Yearly research summary report 2012. <http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
30% Authorship: I was the source of the grant and the principal investigator.
16. Mathers, H. M., Case, L. T., 2011. Weed control and phytotoxicity to selected landscape ornamentals from applications of FreeHand and Snapshot. Yearly research summary report 2011: 1-5. <http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
65% Authorship: I was the source of the grant and the principal investigator.
17. Mathers, H. M., Case, L. T., 2011. Evaluation of different formulations of Indaziflam for weed control in relation to placement of mulch. Yearly research summary report 2011: 6-8. <http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
65% Authorship: I was the source of the grant and the principal investigator.
18. Mathers, H. M., Case, L. T., 2011. Phytotoxicity and efficacy of several products to control liverwort in three propagation environments in Michigan. Yearly research summary report 2011: 9-17. <http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
65% Authorship: I was the source of the grant and the principal investigator.

19. Mathers, H. M., Case, L. T., 2011. Phytotoxicity of several weed control products to containerized and field grown plants at three Michigan nurseries. Yearly research summary report 2011:18-28. <http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
65% Authorship: I was the source of the grant and the principal investigator.
20. Mathers, H. M., Case, L. T., 2011. Phytotoxicity of several weed control products to selected ornamentals in Ohio. Yearly research summary report 2011:29-34. <http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
65% Authorship: I was the source of the grant and the principal investigator.
21. Mathers, H. M., Johnson, D. and Bennett, P. 2011. The correlation between speaker fees and attendance at the OSU Nursery Short Course. Yearly research summary report 2011: 35. <http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
30% Authorship: I was the principal investigator, originator of the study, collected the data.
22. Mathers, H. M., Bigger, M.M. 2011. Greening the highways: Out-plant survival of deciduous trees in stressful environments. Greater Toronto Area, Ontario, Canada. Yearly research summary report 2011:36-41. <http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
45% Authorship: I was the source of the grant, the principal investigator and lead author of the report.
23. Mathers, H. M., Gordon, P. 2011. Midwestern tree liner production with technologies new to the nursery industry. Yearly research summary report 2011:42-46. <http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
30% Authorship: I was the source of the grant and the principal investigator.
24. Mathers, H. M., Case, L. T., 2010. Container weeds control of various Anderson's experimental DG products. Yearly research summary report 2010:1-3. <http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
65% Authorship: I was the source of the grant and the principal investigator.
25. Mathers, H. M., Case, L. T., 2010. Evaluation of experimental formulations of preemergence herbicides applied on top of hardwood mulch for phytotoxicity and efficacy. Yearly research summary report 2010:4-12. <http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
65% Authorship: I was the source of the grant and the principal investigator.
26. Mathers, H. M., Case, L. T., 2010. Weed control and phytotoxicity to selected annuals from applications of FreeHand and Snapshot in a landscape setting. Yearly research summary report 2010:13-16. <http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
60% Authorship: I was the source of the grant and the principal investigator.
27. Mathers, H. M., Case, L. T., 2010. Efficacy and phytotoxicity of SureGuard, V-10233, Barricade + Gallery, and BroadStar when applied around actively growing plants. Yearly research summary report 2010:17-19. <http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
55% Authorship: I was the source of the grant and the principal investigator.
28. Mathers, H. M., Case, L. T., 2010. Phytotoxicity of selected herbicides to ornamental plants at 2010:20-30. <http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
60% Authorship: I was the source of the grant and the principal investigator.
29. Mathers, H. M., Case, L. T., 2010. Phytotoxicity and efficacy of several products to control

- liverwort. Hannah Mathers and Luke Case. Yearly research summary report 2010:31-42.
<http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
 85% Authorship: I was the source of the grant and the principal investigator.
30. Mathers, H. M., Case, L. T., 2010. Phytotoxicity of selected herbicides to containerized ornamentals. Yearly research summary report 2010:43-45.
<http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
 75% Authorship: I was the source of the grant and the principal investigator.
31. Mathers, H. M., Daniel, K. M. and Case, L. T., 2010. Comparison of fertilizers using Advanced Granule Technology with industry standards. Early research summary report 2010:46-58.
<http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
 45% Authorship: I was the source of the grant and the principal investigator.
32. Mathers, H. M., Case, L. T., and Zondag, R. 2010. Field fertilization of trees using controlled release formulations. Yearly research summary report 2010:59-65
<http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
 65% Authorship: I was the source of the grant and the principal investigator.
33. Mathers, H. M. 2010. Bio-herbicide mulch combinations and bio-rational approaches to ornamental weed control for containers and in the field. Yearly research summary report 2010:66-74. <http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
34. Mathers, H. M., Case, L. T., 2010. Characterizing the propagule-seed bank at Michigan nurseries. Yearly research summary report 2011:75-80. <http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
 50% Authorship: I was the source of the grant and the principal investigator.
35. Mathers, H. M., Sage, L., Bigger, M.M. and Case, L. T., 2010. Greening the highways: Increasing survival of out-planted trees in stressful environments. Yearly research summary report 2010:81-87. <http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
 30% Authorship: I was the source of the grant and the principal investigator.
36. Mathers, H. M., Daniel, K. M., Case, L. T., 2010. Effects of various planting depths and root disturbances on four commonly grown nursery trees. Yearly research summary report 2010:88-95. <http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
 30% Authorship: I was the source of the grant and the principal investigator.
37. Rivera, D., and Mathers, H. M. 2010. Double crop system for tree liners using retractable roof greenhouses. Yearly research summary report 2010:96-109.
<http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
 25% Authorship: I was the source of the grant and graduate student supervisor.
38. Mathers, H. M., Case, L. T., Struve, D., Rivera, D., Svenson, S., and Zondag, R. 2009. Growth acceleration and increased out plant survival of Ontario and Ohio grown tree liners. Yearly research summary report 2009: 1-15. <http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
 50% Authorship: I was the source of the grant, lead author, analyzed the data and was the principal investigator.
39. Somireddy, U., Mathers, H. M. and Case, L. T., 2009. Field evaluation of various herbicide and mulch combinations for ornamental weed control. Yearly research summary report 2009:16-19.
<http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>

25% Authorship: I was the source of the grant and graduate student supervisor.

40. Daniel, K.T. and Mathers, H. M. 2009. Effect of postemergent herbicide on sucker removal/injury of field tree liners. Yearly research summary report 2009:20-24.
<http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
25% Authorship: I was the source of the grant and graduate student supervisor.
41. Mathers, H. M., Case, L. T., 2009. Phytotoxicity of selected herbicides to containerized nursery stock in conjunction with the IR-4 program. Yearly research summary report 2009:25-30.
<http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
50% Authorship: I was the source of the grant and principal investigator.
42. Mathers, H. M., Rivera, D. and Case, L. T., 2009. Efficacy of preemergence sedge control materials. Yearly research summary report 2009:31-32.
<http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
50% Authorship: I was the source of the grant and principal investigator.
43. Rivera, D. and Mathers, H. M. 2009. Development of a RRG double crop production system and GeoHumus amendments. Yearly research summary report 2009:33-39.
<http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
25% Authorship: I was the source of the grant and graduate student supervisor.
44. Mathers, H. M. and Case, L. T. 2009. Efficacy of Dimension 2EW with and without Gallery as a tank mix partner. Yearly research summary report 2009:40-41.
<http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
50% Authorship: I was the source of the grant and principal investigator.
45. Mathers, H. M., Case, L. T. and Parish, J. 2009. Evaluation of the invasive and noxious weed species propagule-bank in nurseries and natural areas. Yearly research summary report 2009:42-44. <http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
44% Authorship: I was the source of the grant and principal investigator.
46. Mathers, H. M. 2009. Bioherbicides weed control initiative for nursery and landscape industries. Yearly research summary report 2009:45-47. <http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
47. Rivera, D. and Mathers, H. M. 2008. Development of a double crop production system in retractable roof houses. Yearly research summary report 2008:1-4.
<http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
25% Authorship: I was the source of the grant and graduate student supervisor.
48. Daniel, K. M., Mathers, H. M. and Case, L. T. 2008. Effect of herbicides and grass/groundcover on cold hardiness of field grown nursery stock. Yearly research summary report 2008:6-8.
<http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
25% Authorship: I was the source of the grant and graduate student supervisor.
49. Mathers, H. M. and Case, L. T. 2008. The influence of DNA herbicides and Glyphosate on root and shoot hardiness during nursery field overwintering. Yearly research summary report 2008:9-12. <http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
50% Authorship: I was the source of the grant and principal investigator.
50. Daniel, K.M. and Mathers, H. M. 2008. Effect of postemergent herbicide on sucker removal/injury of field tree liners. Yearly research summary report 2008:13-15.

<http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>

25% Authorship: I was the source of the grant and graduate student supervisor.

51. Daniel, K.M. and Mathers, H. M. 2008. Evaluation of Glyphosate and bottom heat on nursery tree hardiness. Yearly research summary report 2008:16-20.
<http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
25% Authorship: I was the source of the grant and graduate student supervisor.
52. Somireddy, U. and Mathers, H. M. 2008. Field evaluation of various herbicide and mulch combinations for ornamental weed control. Yearly research summary report 2008:21-25.
<http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
25% Authorship: I was the source of the grant and graduate student supervisor.
53. Mathers, H. M. and Case, L. T. 2008. Phytotoxicity of selected herbicides to containerized nursery stock: a review of herbicide trials in 2008. Yearly research summary report 2008:26-36.
<http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
50% Authorship: I was the source of the grant and principal investigator.
54. Mathers, H. M. and Case, L. T. 2008. Efficacy and phytotoxicity of various herbicide treated mulches in the field. Yearly research summary report 2008:37-40.
<http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
50% Authorship: I was the source of the grant and principal investigator.
55. Mathers, H. M. and Case, L. T. 2007. Weed control and phytotoxicity of selected herbicides for container production. Yearly research summary report 2007:2-5.
<http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
60% Authorship: I was the source of the grant and principal investigator.
56. Daniel, K.M., Mathers, H. M. and Case, L. T. 2007. Effect of herbicides and grass/groundcover on cold hardiness of field grown nursery stock. Yearly research summary report 2007:6-9.
<http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
30% Authorship: I was the source of the grant, started the planting and graduate student supervisor.
57. Somireddy, U., Mathers, H. M. and Case, L. T. 2007. Influence of DNA herbicides and glyphosate on cold hardiness during field overwintering. Yearly research summary report 2007:10-13.
<http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
25% Authorship: I was the source of the grant and graduate student supervisor.
58. Daniel, K.M., Mathers, H. M., Case, L. T., Acuna, A. Bigger, M.M., Somireddy, U. 2007. Cold hardiness comparison of containerized and bareroot tree liners outplanted in the field. Yearly research summary report 2007:14-17. <http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
25% Authorship: I was the source of the grant and graduate student supervisor.
59. Mathers, H. M., Case, L. T. and Somireddy, U. 2007. Phytotoxicity of selected new herbicides to containerized nursery stock: The IR-4 Program in 2007. Yearly research summary report 2007:18-20. <http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
60% Authorship: I was the source of the grant and principal investigator.
60. Mathers, H. M., Case, L. T., Rivera, D. Daniel, K.M. and Somireddy, U. 2007. Accelerated whip production using retractable roof greenhouses. Yearly research summary report 2007:21-23.
<http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>

40% Authorship: I was the source of the grant and principal investigator.

61. Mathers, H. M. and Case, L. T. 2007. Field growth of three tree liners planted from containers from three environments. Yearly research summary report 2007:24-28.
<http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
55% Authorship: I was the source of the grant and principal investigator.
62. Somireddy, U., Mathers, H. M. and Case, L. T. 2007. Field evaluation of various herbicide formulations combined with mulches. Yearly research summary report 2007:29-33.
<http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
25% Authorship: I was the source of the grant and graduate student supervisor.
63. Mathers, H. M. and Case, L. T. 2006. Determination of the optimum species for Ohio tree liner production in retractable roof greenhouses: Year 2. Yearly research summary report 2006:1-2.
<http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
75% Authorship: I was the source of the grant and principal investigator.
64. Mathers, H. M., Case, L. T., Acuna, Alejandra and Bigger, M.M. 2006. Field comparison of containerized and bareroot tree liners. Yearly research summary report 2006:3-8.
<http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
55% Authorship: I was the source of the grant and principal investigator.
65. Mathers, H. M. and Case, L. T. 2006. Field evaluation of herbicide treated mulches. Yearly research summary report 2006:9-12. <http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
65% Authorship: I was the source of the grant and principal investigator.
66. Mathers, H. M. and Case, L. T. 2006. Weed control and phytotoxicity of selected herbicides for container production. Yearly research summary report 2006:13-14.
<http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
45% Authorship: I was the source of the grant and principal investigator.
67. Mathers, H. M. and Case, L. T. 2006. Control of liverwort in herbaceous perennials. Yearly research summary report 2006:15-18 <http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
55% Authorship: I was the source of the grant and principal investigator.
68. Mathers, H. M. and Case, L. T. 2006. Phytotoxicity of SureGuard, SedgeHammer, Dismiss, and V-10142 on selected nursery crops. Yearly research summary report 2006:19-23.
<http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
55% Authorship: I was the source of the grant and principal investigator.
69. Acuna, A. and Mathers, H. M. 2006. "The power of technical help" A bilingual on-site educational program for Hispanic workers in the nursery industry. Yearly research summary report 2006:24.
<http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
25% Authorship: I was the source of the grant and graduate student supervisor.
70. Acuna, A. and Mathers, H. M. Multistate survey of nursery laborer level of employees: OH, MI, DE, TN, FL, IN, AZ and RI. Yearly research summary report 2006:25-29.
<http://basicgreen.osu.edu/english/resources/yearly-research-summary-reports/>
25% Authorship: I was the source of the grant and graduate student supervisor.

v) *Abstracts and Short Entries (not peer-reviewed)*

1. Mathers, H.M., Daniel, K, Case, L.T. and Rivera, D. 2011. Effects of various planting depths and root disturbances on four commonly grown nursery trees. *HortScience* 46(9):96-97.
40% Authorship: Lead author for this abstract and wrote the grant.
2. Mathers, H.M. 2011. Bio-herbicide treated mulches for ornamental weed control. *HortScience* 46(9): 127.
3. Mathers, H.M., Bennett, P., Johnson, D. 2011. The price is wrong—A correlation between speaker fees and program attendance. *HortScience* 46(9):142.
40% Authorship: Lead author for this abstract and wrote the grant.
4. Mathers, H. and Case, L.T. 2011. Phytotoxicity and efficacy of several products to control liverwort. *HortScience* 46(9):173.
45% Authorship: I wrote the grant and was lead author for this abstract.
5. Bigger, M., Mathers, H., Sage, L. 2011. Greening the highways—Out-plant survival of deciduous trees in stressful environments. *HortScience* 46(9):265-266.
35% Authorship: Wrote the grant and supervising graduate student.
6. Gordon, P. and Mathers, H. 2011. Technologies to shorten tree whip production time in Ohio. *HortScience* 46(9):323.
45% Authorship: I wrote the grant and was supervising graduate student.
7. Mathers, H. M., Case, L.T., Zondag, R. 2010. Nursery field fertilizer evaluations in Ontario and Ohio. *American Society for Horticultural Science. HortScience.* 45(8):107-108.
55% Authorship: I wrote the grant and was lead author for this abstract.
8. Rivera, D., Mathers, H. M. 2010. Using retractable roof greenhouses and pot-in-pot systems for the development of double cropped tree liners. *American Society for Horticultural Science. HortScience.* 45(8):273.
15% Authorship: I wrote the grant and was the principle investigator.
9. Case, L. T., Mathers, H. M., 2010. Comparison of fertilizers using advance granule technology with industry standards. *American Society for Horticultural Science. HortScience.* 45(8):236.
40% Authorship: Principle investigator and grant writer.
10. Mathers, H. M., Gordon, P. 2010. Technology for improved tree liner production in Ontario, Canada. *American Society for Horticultural Science. HortScience.* 45(8):234.
35% Authorship: Lead author for this abstract and grant writer.
11. Case, L. T., Mathers, H. M., Daniel, K., Somireddy, U., and Rivera, D. 2009. Weed control trials on selected ornamentals at the Ohio State University. *American Society for Horticultural Science. HortScience.* 44(4):1531.
40% Authorship: Principle investigator and grant writer.
12. Rivera, D., Mathers, H. M., and Case, L. T. 2009. Development of a double crop production system using retractable roof houses. *American Society for Horticultural Science. HortScience.* 44(4):1564.
25% Authorship: Principle investigator, grant write, graduate student supervisor.
13. Johnson, D. and Mathers, H. M. 2009. Evaluation of program changes with the Ohio State University Nursery Short Course. *American Society for Horticultural Science. HortScience* 44(4):1901.
40% Authorship: Originator of idea, data collection, data formatting, supervisor.

14. Daniel, K., Mathers, H. M., and Case, L. T. 2009. Effect of postemergence herbicide on sucker removal / injury of field tree liners. American Society for Horticultural Science. HortScience. 44(4):2158.
20% Authorship: Principle investigator, grant writer and graduate student supervisor.
15. Somireddy, U., Mathers, H. M., Case, L. T. and Daniel, K. 2009. Field evaluation of herbicide and mulch combinations for weed control efficacy. American Society for Horticultural Science. HortScience. 44(4):2294.
20% Authorship: Principle investigator, grant writer and graduate student supervisor.
16. Mathers, H. M., Case, L.T. Somireddy, U., Daniel, and Parrish, J. 2009. New herbicide and mulch combination products. Northeastern Weed Science Society Proceedings. 63:26.
45% Authorship: I wrote the grant and was lead author for this abstract.
17. Daniel, K.M., Mathers, H.M. and Case, L.T. 2009. Evaluation of glyphosate and bottom heat on nursery tree hardiness. Northeastern Weed Science Society Proceedings. 63:29.
25% Authorship: Grant writer; principle investigator, graduate student supervisor.
18. Case, L.T. and Mathers, H.M. 2009. Trial results at the Ohio State University with dimethamid-p, dimethamid-p + pendimethalin, mesotrione G, and imazosulfuron Northeastern Weed Science Society Proceedings. 63:67.
45% Authorship: Grant writer; principle investigator.
19. Daniel, K., Mathers, H. M., Case, L. T., and Somireddy, U. 2008. Effect of herbicides and grass/groundcover on cold hardiness of field grown nursery stock. American Society for Horticultural Science. HortScience. 43(4):1252.
25% Authorship: Grant writer; principle investigator, graduate student supervisor.
20. Somireddy, U., Mathers, H. M., and Case, L. T. 2008. Field evaluation of herbicide and mulch combinations for weed control efficacy. American Society for Horticultural Science. HortScience. 43(4):1253.
20% Authorship: Grant writer; principle investigator, graduate student supervisor.
21. Rivera, D., Mathers, H. M., and Case, L. T. 2008. Accelerated tree whip production using retractable roof greenhouses. American Society for Horticultural Science. HortScience. 43(4):1281.
20% Authorship: Grant writer; principle investigator, graduate student supervisor.
22. Jiang, L. Dami, I.E., Mathers, H. M., and Doohan, D. 2008. Simazine treated mulch improved lambsquarters (*Chenopodium album*) control. Weed Science Society of America Program and Abstracts. 48: 36.
15% Authorship: Original concept, data interpretation.
23. Somireddy, U., Mathers, H. M., and Case, L. T. 2007. Influence of DNA herbicides on cold hardiness during nursery field overwintering. American Society for Horticultural Science. HortScience. 42(2):921.
20% Authorship: Principle investigator and grant writer, graduate student supervisor.
24. Acuna, A., and Mathers, H. M. 2007. Multistate survey of nursery laborer-level employees: Ohio, Michigan, Delaware, Tennessee, Florida, Indiana, Kentucky, Arizona and Rhode Island. American Society for Horticultural Science. HortScience 42(4):854.
25% Authorship: Principle investigator and grant writer, graduate student supervisor.
25. Daniel, K., Mathers, H. M., and Case, L. T. 2007. Bark cracking. American Society for Horticultural Science. HortScience 42(4):876.
25% Authorship: Principle investigator and grant writer, graduate student supervisor.

26. Mathers, H. M., and Case, L. T. 2007. Determination of optimum species for tree liner production in Ohio. American Society for Horticultural Science. HortScience 42(4):995.
45% Authorship: I wrote the grant and was lead author for this abstract.
27. Cuthbert, C., and Mathers, H. M. 2007. The Ohio State University Nursery Short Course. American Society for Horticultural Science. HortScience 42(4):997.
25% Authorship: Original concept, data interpretation assisted with writing and editing.
28. Case, L.T., H.M Mathers, and E. Grosskurth. 2006. Determination of the optimum species for Ohio tree liner production in retractable roof greenhouses. HortScience 41(4):1026-1027.
40% Authorship: Principle investigator and grant writer.
29. Mathers, H.M. 2006. Retractable roof greenhouses in nursery production of woody trees. HortScience 41(4):952.
30. Mathers, H.M. and M.M. Bigger. 2006. Bark splitting and other cold hardiness effects of ornamental herbicides. HortScience 41(4):976.
40% Authorship: I wrote the grant and was lead author for this abstract.
31. Acuna, A., H.M. Mathers, and L.T. Case. 2006. Implementing and assessing a bilingual educational program for Hispanic nursery workers in Ohio. HortScience 41(4):1055-1056.
20% Authorship: Principle investigator and grant writer.
32. Mathers, H., L.T. Case, L.T. 2006. Field evaluation of herbicide and mulch combinations for ornamental weed control. Weed Science Society of America Program and Abstracts. 46:100.

50% Authorship: Lead author for this abstract and grant writer.
33. Case, L.T. and H.M. Mathers. 2006. Possible new uses for new and old ornamental herbicides. Northeastern Weed Science Society Proceedings. 60:64.
35% Authorship: Principle investigator and grant writer.
34. Bigger, M and H.M. Mathers. 2006. Root hardiness and the influence of DNA herbicides in overwintered containers. Northeastern Weed Science Society Proceedings. 60:63.
20% Authorship: Principle investigator and grant writer, graduate student supervisor.
35. Acuna, A. and H.M. Mathers. 2006. The influence of DNA herbicides on overwintering oak seedlings. Northeastern Weed Science Society Proceedings. 60:7.
15% Authorship: Principle investigator and grant writer, graduate student supervisor.
36. Case L.T. and H.M. Mathers. 2005. Oryzalin movement in one-gallon containers from spray oryzalin-treated mulch applications. HortScience 40(4):1102.
45% Authorship: Principle investigator and grant writer.
37. Mathers, H.M. and L.T. Case. 2005. Field evaluation of various herbicide and mulch combinations for ornamental weed control. HortScience 40(4):997-998.
45% Authorship: Lead author for this abstract and grant writer.
38. Case L.T. and H.M. Mathers. 2005. Effects of dinitroaniline herbicides on root development in containers. Northeastern Weed Science Society Proceedings. 59:38.
35% Authorship: Principle investigator and grant writer.

39. Mathers, H.M. and L.T. Case. 2005. Field evaluation of various herbicide and mulch combinations for ornamental weed control. *Northeastern Weed Science Society Proceedings*. 59:45.
65% Authorship: Lead author for this abstract and grant writer.

vi) *Papers in Proceedings (editor reviewed)*

1. Mathers, H.M. 2013. Herbicide damage to woody plants and relationship to mode-of-action. Pages: 47-52. In C. Folk (Ed). 2013 Ohio pesticide commercial applicator. 2013 Recertification Conferences. Pesticide Education Program, Ohio State University, Columbus, OH.
2. Mathers, H.M. 2013. The ups and downs of mulch plus herbicides. Pages: 52-55. In C. Folk (Ed). 2013 Ohio pesticide commercial applicator. 2012 Recertification Conferences. Pesticide Education Program, Ohio State University, Columbus, OH.
3. Mathers, H.M. 2012. Long-term effects of herbicides on trees. Pages: 83-88. In C. Folk (Ed). 2012 Ohio pesticide commercial applicator. 2012 Recertification Conferences. Pesticide Education Program, Ohio State University, Columbus, OH.
4. Mathers, H.M. 2012. Environmentally friendly: Ornamental weed control with bio-herbicides and bio-rational approaches. Pages: 124- 129. In C. Folk (Ed). 2012 Ohio pesticide commercial applicator. 2012 Recertification Conferences. Pesticide Education Program, Ohio State University, Columbus, OH.
5. Mathers, H.M. (Technical advisor/ contributor). Chapter 3. Weed Management. In C. Folk and J. Kick-Raack (authors) 2012. A study guide for commercial ornamental applicators: Category 6A. Ohio Pesticide Safety Education Program.
6. Mathers, H.M. 2011. Current Knowledge of Causes and Influence of Bark Cracking. Pages: 100-103. In C. Folk (Ed). 2011 Ohio pesticide commercial applicator. 2011 Recertification Conferences. Pesticide Education Program, Ohio State University, Columbus, OH.
7. Mathers, H.M. 2011. Herbicide Treated Mulch. Pages: 64-66. In C. Folk (Ed). 2011 Ohio pesticide commercial applicator. 2011 Recertification Conferences. Pesticide Education Program, Ohio State University, Columbus, OH.
8. Mathers, H.M. 2011. Going greener: Alternative ornamental weed control. Pages: 11-17. In Landscape Contractors Association 2011 pesticide recertification conferences. Pesticide Education Program, LCA, Chevy Chase, MD.
9. Mathers, H.M. 2011. Under Pressure: Thinned barked trees and bark cracking. Pages: 50-54. In Landscape Contractors Association 2011 pesticide recertification conferences. Pesticide Education Program, LCA, Chevy Chase, MD.
10. Mathers, H.M. 2010. Your Trees on Crack: Causes of Bark Splitting. *Great Lakes Fruit, Vegetable and Farm Proceedings*. Grand Rapids, MI.
11. Mathers, H.M. 2010. Your Trees on Crack: Causes of Bark Splitting. *Green Industry Conference Proceedings*. Edmonton Expo Centre.
12. Mathers, H. M., Case, L. T. and Rivera, D. 2008. Retractable Roof Greenhouse (RRG) Versus Bareroot Tree Liner Post Harvest Survival and Growth in Nursery Production *International Plant Propagators Society. Eastern/Western Region. International Plant Propagator's Combined Proceedings* 58: 260-267.
50% Authorship: Lead author in these proceedings.

13. Daniel, K., Mathers, H. M. and L.T. Case 2008. Evaluation of glyphosate and bottom heat on nursery tree hardiness. Proceedings of Southern Nurserymen's Association Research Conference 53: 79-84.
25% Authorship: Graduate student supervisor, wrote the grant, designed the experiment, and wrote sections of the paper.
14. Case, L.T. and Mathers, H.M. 2008. The influence of DNA herbicides and glyphosate on root and shoot hardiness during nursery field overwintering. Proceedings of Southern Nurserymen's Association Research Conference 53:96-99.
55% Authorship: I had the original concept and I assisted writing the proceedings.
15. Mathers, H. M., and Case, L. T. 2007. Accelerated tree liner production in retractable roof greenhouses. International Plant Propagators Society. Region of Great Britain and Ireland. International Plant Propagator's Combined Proceedings 57:3-9.
70% Authorship: Lead author of these proceedings, data compilation, analyses, Principle investigator.
16. Mathers, H.M. 2007-2008. Herbicide injury. Pages: 45-50. In C. Folk (Ed). 2007-2008 Recertification Conferences for Ohio Pesticide Commercial Applicators. Pesticide Education Program, Ohio State University, Columbus, OH.
17. Case, L. T., and Mathers, H. M. 2007. Controlling Liverwort and Moss in Overwintering Containers of Herbaceous Perennials. Proceedings of Southern Nurserymen's Association Research Conference 52:166-169.
55% Authorship: I had the original concept and I assisted writing the proceedings.
18. Somireddy, U., Mathers, H. M., and Case, L. T. 2007. Field evaluation of various herbicide formulations combined with mulches. Proceedings of Southern Nurserymen's Association Research Conference 52:190-194.
20% Authorship: Originated concept, designed project, and was graduate student supervisor.
19. Acuna, A. and Mathers, H. M. 2007. Multistate survey of nursery laborer level employees: A complex survey analysis. Proceedings of Southern Nurserymen's Association Research Conference 52:389-394.
25% Authorship: Lead author of these proceedings, graduate student supervisor.
20. Cuthbert, C., Mathers, H.M. and Bennett, P. 2007. Marketing and evaluation of a streamlined nursery industry educational program. Proceedings of Southern Nurserymen's Association Research Conference 52:413-417.
50% Authorship: Original concept, wrote sections of the paper, assisted in the evaluations.
21. Mathers, H.M. 2006-2007. Herbicide injury. Pages: 21-27. In C. Folk (Ed). 2006-2007 Recertification Conferences for Ohio Pesticide Commercial Applicators. Pesticide Education Program, Ohio State University, Columbus, OH.
22. Mathers, H.M., L.T. Case, A. Acuna and M. Bigger. 2006. Field comparison of containerized and bareroot tree liners. Proceedings of Southern Nurserymen's Association Research Conference 51: 127-130.
45% Authorship: Lead author of these proceedings and designed the project.
23. Case, L.T. and Mathers, H.M. 2006. Field evaluation of herbicide treated mulches. Proceedings of Southern Nurserymen's Association Research Conference 51:402-405.
70% Authorship: I had the original concept and wrote sections of the paper.

24. Acuna, A. and H.M. Mathers. 2006. Multistate survey of nursery laborer level employees: OH, MI, DE, TN, FL, IN, AZ and RI Preliminary Results. Proceedings of Southern Nurserymen's Association Research Conference 51: 279-283.
25% Authorship: Lead author of these proceedings, graduate student supervisor.
25. Mathers, H.M. 2005-2006. Ornamental weed control. Pages: 30-34. *In* C. Folk and C. Whitaker (Eds). 2005-2006 Recertification Conferences for Ohio Pesticide Commercial Applicators. Pesticide Education Program, Ohio State University, Columbus, OH.
26. Mathers, H.M. 2005. Industrial Vegetation Herbicide Table. Pp. 36-38. Technical Advisor. Ohio Pesticide Applicator Training: A Study Guide for Commercial Industrial Vegetation Applicators. Ohio State University Extension. Bulletin 841-5: 1-105.
27. Bigger, M. and H.M. Mathers. 2005. Root hardiness and the influence of DNA herbicides on overwintered containers. Proceedings of Southern Nurserymen's Association Research Conference 50:22-25.
25% Authorship: Graduate student supervisor.
28. Case, L.T., H.M. Mathers, S.K. Harrison, S. Lowe and A. Acuna. 2005. Oryzalin movement in one-gallon containers from spray and oryzalin-created mulch applications. Proceedings of Southern Nurserymen's Association Research Conference 50:464-467.
30% Authorship: I designed the project, and assisted with analyzed the data.
29. Mathers, H.M. 2005. Field caliper tree production using retractable roof greenhouse grown liners. Proceedings of Southern Nurserymen's Association Research Conference 50:164-167.
30. Mathers, H.M. and L.T. Case. 2005. Field evaluation of various herbicide and mulch combinations for ornamental weed control. Proceedings of Southern Nurserymen's Association Research Conference 50: 472-474.
85% Authorship: I had the original concept, analyzed data, assisted in evaluations, and I was the lead author of these proceedings.
31. Mathers, H.M. 2004-2005. Ornamental weed control. Pages: 42-47. *In* C. Folk (Eds). 2004-2005 Recertification Conferences for Ohio Pesticide Commercial Applicators. Pesticide Education Program, Ohio State University, Columbus, OH.

vi) Unpublished Scholarly Presentations

Invited Presentations

International

1. Mathers, H.M. 2014. Question and Answers with Hannah. 2014 IQDHO to 40 Quebec industry members. Drummondville, Quebec, Canada (January 31).
2. Mathers, H.M. 2014. Dirty Deeds Done Dirt Cheap: Container Weed Control. 2014 IQDHO to 110 Quebec industry members. Drummondville, Quebec, Canada (January 30).
3. Mathers, H.M. 2014. Your Trees on Crack: Reasons for Bark Cracking. 2014 IQDHO to 110 Quebec industry members. Drummondville, Quebec, Canada (January 30).

4. Mathers, H.M. 2014. Mode of Action of Herbicides for Ornamental Crop Production. 2014 IQDHO to 110 Quebec industry members. Drummondville, Quebec, Canada (January 30).
5. Mathers, H.M. 2013. What the World Needs Now: Improving Urban Tree Survival. Presented at Landscape Ontario Congress to 90 industry members. Toronto, ON, Canada. (January 8).
6. Mathers, H.M. 2013. Going Greener: Bioherbicides for Landscape Weed Control. Presented at Landscape Ontario Congress to 220 industry members. Toronto, ON, Canada. (January 7)
7. Mathers, H.M. 2011. Fertilizing landscape trees. Presented to Landscape Alberta Nursery Trades Association to 75 industry members. Edmonton, AB, Canada. (November 18)
8. Mathers, H.M. 2011. Landscape Weed Control: More Bite to Bark. Presented to Landscape Alberta Nursery Trades Association to 75 industry members. Edmonton, AB, Canada. (November 18)
9. Mathers, H.M. 2011. Shocked or Not? The First Years in the Landscape. Presented to Saskatchewan Nursery and Landscape Association to 65 industry members. Saskatoon, SK, Canada. (March 17)
10. Mathers, H.M. 2011. Fertilizing Landscape Trees. Presented to Saskatchewan Nursery and Landscape Association to 65 industry members. Saskatoon, SK, Canada. (March 17)
11. Mathers, H.M. 2011. Landscape Weed Control: More Bite to Bark. Presented to Saskatchewan Nursery and Landscape Association to 65 industry members. Saskatoon, SK, Canada. (March 17)
12. Mathers, H.M. 2011. Overview of Nursery Research Program. Presented at Vineland Research Planning Session to 65 industry members and university officials. Vineland Station, ON, Canada. (January 28)
13. Mathers, H.M. 2010. Site Preparation for Field Nurseries: The First Years. Presented to Landscape Alberta Nursery Trades Association to 75 industry members. Edmonton, AB, Canada. (November 18)
14. Mathers, H.M. 2010. Yours trees on crack: Causes of bark splitting. Presented to Landscape Alberta Nursery Trades Association to 75 industry members. Edmonton, AB, Canada. (November 18)
15. Daniel, K. and Mathers, H.M. 2010. Liner production. Presented at 3rd Joint VRIC, Guelph University, Landscape Ontario Horticultural Trades Association and Ohio State University Research Day to 65 industry members and university officials. Vineland Station, ON, Canada. (September 16)
30% Contributor to Graduate Student Presentation
16. Mathers, H.M. 2010. Field Fertilizing. Presented at 3rd Joint VRIC, Guelph University, Landscape Ontario Horticultural Trades Association and Ohio State University Research Day to 65 industry members and university officials. Vineland Station, ON, Canada. (September 16)
17. Mathers, H.M. 2010. Liverwort Control. Presented at 3rd Joint VRIC, Guelph University, Landscape Ontario Horticultural Trades Association and Ohio State University Research Day to 65 industry members and university officials. Vineland Station, ON, Canada. (September 16)
18. Mathers, H.M. 2010. Non-Chemical Weed Control for Landscape Beds. Presented at Vineland Research and Innovation Centre & Master Gardeners of Ontario Inc. to 65 professional society members. Vineland Station, ON, Canada. (September 12)
19. Mathers, H.M. 2010. My research in Ontario. Presented at Landscape Ontario Nursery Grower's S.C. to 225 industry members. Burlington, ON, Canada. (February 10)

20. Mathers, H.M. 2010. Landscape Weed Control: More Bite to Bark. Presented at Landscape Ontario Congress to 90 industry members. Toronto, ON, Canada. (January 13)
21. Mathers, H.M. 2009. Research Update. Presented at Landscape Ontario Growers Meeting to 80 industry members. Oakville, ON, Canada. (November 20)
22. Rivera, D. and Mathers, H.M. 2009. Development of a double crop production system using retractable roof houses. Presented at 2nd Joint VRIC, Guelph University, Landscape Ontario Horticultural Trades Association and Ohio State University Research Day to 70 industry members and university officials. Vineland Station, ON, Canada. (October 1)
30% Contributor to Graduate Student Presentation
23. Daniel, K. and Mathers, H.M. 2009. Summary of Glyphosate and bark cracking. Presented at 2nd Joint VRIC, Guelph University, Landscape Ontario Horticultural Trades Association and Ohio State University Research Day to 70 industry members and university officials. Vineland Station, ON, Canada. (October 1)
30% Contributor to Graduate Student Presentation
24. Somireddy, U. and Mathers, H.M. 2009. Herbicide and bio-herbicide treated mulch. Presented at 2nd Joint VRIC, Guelph University, Landscape Ontario Horticultural Trades Association and Ohio State University Research Day to 70 industry members and university officials. Vineland Station, ON, Canada. (October 1)
30% Contributor to Graduate Student Presentation
25. Parrish, J. and Mathers, H.M. 2009. Weed propagule bank and invasive species. Presented at 2nd Joint VRIC, Guelph University, Landscape Ontario Horticultural Trades Association and Ohio State University Research Day to 70 industry members and university officials. Vineland Station, ON, Canada. (October 1)
30% Contributor to Graduate Student Presentation
26. Case, L. and Mathers, H.M. 2009. Evaluation of 2009 Sponsored Research Trials. Presented at 2nd Joint VRIC, Guelph University, Landscape Ontario Horticultural Trades Association and Ohio State University Research Day to 70 industry members and university officials. Vineland Station, ON, Canada. (October 1)
30% Contributor to Research Associate Presentation
27. Mathers, H.M. 2009. Tree liner production. Presented at Ministry of Transportation Open House at VRIC to 70 industry members and government officials. Vineland Station, ON, Canada. (September 9)
28. Mathers, H.M. 2009. Site preparation for field nurseries. Presented at Ontario S.C. to 225 industry members. Toronto, ON, Canada. (February 11)
29. Mathers, H.M. 2009. Liner root problems. Presented at Ontario S.C. to 225 industry members. Toronto, ON, Canada. (February 11)
30. Mathers, H.M. 2008. Non-chemical weed control in landscape beds. Presented at Royal Ontario Winter Fair to 35 government officials. Toronto, ON, Canada. (November 12)
31. Mathers, H.M. 2008. Winter injury of ornamental plants. Presented at Royal Ontario Winter Fair to 35 government officials. Toronto, ON, Canada. (November 12)

32. Mathers, H.M. 2008. Retractable roof greenhouse (RRG) versus bare root tree liner post-harvest survival and growth in nursery production. Presented at International Society of Horticulture Society's 9th Int. Sym. On Postharvest Quality of Ornamental Plants to 170 industry members. Odense, Denmark. (August 12)
33. Mathers, H.M. 2008. Weed control. Choosing the right herbicide. Presented at The Canadian Nursery Trades' Manitoba Green Show to 150 industry members. Winnipeg, MB, Canada. (February 19)
34. Mathers, H.M. 2008. Tree liner production in RRG's. Presented at The Canadian Nursery Trades' Manitoba Green Show to 50 industry members. Winnipeg, MB, Canada. (February 20)
35. Mathers, H.M. 2007. Tree liner production: Sense and sensibility. Presented at International Plant Propagators Society, Region of Great Britain and Ireland to 65 professional society members. Branford, Worcestershire England. (October)
36. Mathers, H.M. 2007. Ornamental weed control. Organizer / Speaker. Presented at British Columbia Landscape and Nursery Association Short Course to 65 industry members. Langley, BC, Canada. (July)

National

1. Mathers, H.M. 2015. What's in your weed control toolbox. CENTS. 95 industry members. Columbus, OH. (January 7).
2. Mathers, H.M. 2015. Dirty deeds done dirt cheap-er: Landscape weed control. 95 industry members. Columbus, OH. (January 7).
3. Mathers, H.M. 2014. Sustainable Nursery and Landscape Practices. ONLA's Central Environmental Nursery Trade Show and OSU Nursery Short Course Bioplastics Container Cropping Systems Workshop. 50 industry members. Columbus, OH. (January 12).
4. Mathers, H.M. 2014. Understanding Landscape Sustainability. Presented at ONLA's Central Environmental Nursery Trade Show and OSU Nursery Short Course to 200 industry members. Columbus, OH. (January 14).
5. Mathers, H.M. 2014. Weeds Just Want to Have Fun. Presented at ONLA's Central Environmental Nursery Trade Show and OSU Nursery Short Course to 130 industry members. Columbus, OH. (January 14).
6. Mathers, H.M. 2014. Dirty Deeds Done Dirt Cheaper: CORE, Insecticides, Fungicides and Herbicide MoA's. Presented at ONLA's Central Environmental Nursery Trade Show and OSU Nursery Short Course to 200 industry members. Columbus, OH. (January 13).
7. Mathers, H.M. 2013. Landscape Weed Control, Strategies & BMPs. Ohio Turfgrass Foundation (OTF). Columbus, OH (Dec. 04, 2013).
8. Mathers, H.M. 2013. Born to be Wild: Controlling Landscape Weeds, Strategies & BMPs. Ohio Turfgrass Foundation (OTF). Columbus, OH (Dec. 03, 2013).
9. Mathers, H.M. 2013. Weed Identification of Nursery Containers and Landscapes. Presented at OFA Short Course and Expo to 60 industry members. Vancouver, WA. (Sept. 11).
10. Mathers, H.M. 2013. Weed Control Nursery Fields. Presented at OFA Short Course and Expo to 40

industry members. Vancouver, WA. (Sept. 11).

11. Mathers, H.M. 2013. Identification of Nursery Weeds. Presented at OFA Short Course and Expo to 65 industry members. Columbus, OH. (July 13).
12. Mathers, H.M. 2013. Weed Control in Field Grown Nursery Production. Presented at OFA Short Course and Expo to 40 industry members. Columbus, OH. (July 14).
13. Mathers, H.M. 2013. Dirty Deeds Done Dirt Cheap-er. Presented at Oregon Association of Nurseries' FarWest Show Seminars to 278 industry members. Portland, OR. (August 23).
14. Mathers, H.M. 2013. Lifestyles of Famous: The Top 10. Presented at New England Grows to 1,800 industry members. Boston, MA. (February 07).
15. Bigger, M. and Mathers, H.M. 2013. Incorporating urban forests into the landscape. Presented at ONLA's Central Environmental Nursery Trade Show and OSU Nursery Short Course to 200 industry members. Columbus, OH. (January 14).
16. Mathers, H.M. 2013. 10 Most Unwanted: Landscape Weed Control. Presented at ONLA's Central Environmental Nursery Trade Show and OSU Nursery Short Course to 200 industry members. Columbus, OH. (January 14).
17. Mathers, H.M. 2013. What's New in Nursery Field and Container Weed Control? Presented at ONLA's Central Environmental Nursery Trade Show and OSU Nursery Short Course to 200 industry members. Columbus, OH. (January 15).
18. Mathers, H.M. 2012. Current options for synthetic herbicides and natural organic approaches in landscape beds. Ohio Turfgrass Foundation (OTF) to 130 professionals. Columbus, OH (Dec. 03, 2012).
19. Mathers, H.M. 2012. Using Herbicides in Container Perennials. Presented at the OFA Perennial Production Conference to 125 industry members. Grand Rapids, MI. (Sept.12).
20. Mathers, H.M. 2012. Pest Management Unscripted at the OFA Perennial Production Conference to 80 industry members. Grand Rapids, MI. (Sept.12).
21. Mathers, H.M. 2012. Sustainability in horticulture: Nursery and landscape. Presented at 2012 Bio-plastics Conference to 40 university officials. Ames, IA. (August 15).
22. Mathers, H.M. 2012. Christmas trees in pot-in-pot. Presented at Mid America Christmas Tree Program to industry members. Granville, OH. (July 27)
23. Mathers, H.M. 2012. Going greener: Alternative ornamental weed control. Presented at OFA Short Course and Expo to industry members. Columbus, OH. (July 16)
24. Mathers, H.M. 2012. 10 Most Unwanted: Landscape Weed Control. Presented at ONLA's Central Environmental Nursery Trade Show and OSU Nursery Short Course to 200 industry members. Columbus, OH. (January 25).
25. Mathers, H.M. 2012. Herbicide MoA- Why You Should Know. Presented at ONLA's Central Environmental Nursery Trade Show and OSU Nursery Short Course to 250 industry members. Columbus, OH. (January 24).

26. Mathers, H.M. 2012. Weed Control in Nursery Fields and Landscapes. Presented at ONLA's Central Environmental Nursery Trade Show and OSU Nursery Short Course to 65 industry members. Columbus, OH. (January 22).
27. Mathers, H.M. 2012. Herbicide Injury: MoA's. Presented at ONLA's Central Environmental Nursery Trade Show and OSU Nursery Short Course to 65 industry members. Columbus, OH. (January 22).
28. Mathers, H.M. 2012. Alternative Methods of Control. Presented at ONLA's Central Environmental Nursery Trade Show and OSU Nursery Short Course to 65 industry members. Columbus, OH. (January 22).
29. Mathers, H.M. 2011. Fertilizing Landscape Trees. Presented to ONLA's Central Environmental Nursery Trade Show and OSU Nursery Short Course to 300 industry members. Columbus, OH. (January 25).
30. Mathers, H.M. 2011. Environmentally Friendly Alternative Herbicides. Presented to ONLA's Central Environmental Nursery Trade Show and OSU Nursery Short Course to 200 industry members. Columbus, OH. (January 25).
31. Mathers, H.M. 2011. Greening the Highways. Presented to ONLA's Central Environmental Nursery Trade Show and OSU Nursery Short Course to 50 industry members. Columbus, OH. (January 24).
32. Mathers, H.M. 2011. Frost Cracking. Presented to ONLA's Central Environmental Nursery Trade Show and OSU Nursery Short Course to 200 industry members. Columbus, OH. (January 24).
33. Mathers, H.M. 2011. Environmentally Friendly: Alternative Container Weed Control. Presented at Oregon Association of Nurseries' FarWest Show Seminars to 250 industry members. Portland, OR. (August 25)
34. Mathers, H.M. 2011. Crop Safety IR-4 Update in Nursery. Presented at USDA/IR-4 Ornamental Program Meeting to 60 USDA officials. Sacramento, CA. (October 5)
35. Mathers, H.M. 2011. Tree Fruit - New Pest Management: What is Glyphosate Really Doing to your Trees? Presented at Empire State Fruit and Vegetable Expo to 340 industry members. Syracuse, NY. (January 27)
36. Mathers, H.M. 2010. Current Knowledge of Causes and Influences of Bark Cracking. Presented at Great Lakes Fruit, Vegetable & Farm Market to 215 industry members. Grand Rapids, MI. (December 7)
37. Mathers, H.M. 2010. Managing and Controlling Weeds in Landscape Ornamentals Using BMP's and Herbicides. Presented at Ohio Turfgrass Foundation (OTF) to 45 industry members. Columbus, OH. (December 9).
38. Mathers, H.M. 2010. More Bark to Your Bite: Bio-treated Herbicide Mulch. Presented at Ohio Turfgrass Foundation (OTF) to 45 industry members. Columbus, OH. (December 9).
39. Mathers, H.M. 2010. The Vague and Formless: Understanding Field Fertilizing. Presented at The Ohio State University Nursery Short Course and CENTS to 55 industry members. Columbus, OH. (January 26)
40. Mathers, H.M. 2010. Chemical Disorders: Double, Double Toil and Trouble. Presented at The Ohio State University Nursery Short Course and CENTS to 97 industry members. Columbus, OH.

(January 27)

41. Mathers, H.M. 2009. Reduce, Reuse, and Recycle: The Three R's and Weed Control. Presented to The Ohio State University Nursery Short Course and CENTS to 202 industry members. Columbus, OH. (January 27)
42. Mathers, H.M. 2009. Long-term Effects of Herbicides on Street Trees. Presented to The Ohio State University Nursery Short Course and CENTS to 43 industry members. Columbus, OH. (January 27)
43. Mathers, H.M. 2009. "ACE" System of Tree Liner Production. Presented to The Ohio State University Nursery Short Course and CENTS to 43 industry members. Columbus, OH. (January 27)
44. Mathers, H.M. 2008. Bark cracking and the role of glyphosate. Presented at Monsanto Turf and Ornamental Program to 5 industry members. St. Louis, MO. (November 13)
45. Mathers, H.M. 2008. Your trees on crack. Presented at Oregon Association of Nurseries' FarWest Show Seminars to 170 industry members. Portland, OR (August)
46. Mathers, H.M. 2008. It's a Weedy World Workshop - More bite to bark. Presented at American Society for Horticultural Science to 64 professional society members. Orlando, FL. (July)
47. Mathers, H.M. 2008. New Technology Workshop – Growing tree liners in RRG's. Presented at American Society for Horticultural Science to 50 professional society members. Orlando, FL. (July)
48. Mathers, H.M. 2007. The latest research in ornamental weed control: Reduce, reuse and recycle. Presented at Oregon Association of Nurseries' FarWest Show Seminars to 300 industry members. Portland, OR. (August)
49. Mathers, H.M. 2007. Know the "cide" in herbicide. Presented at Oregon Association of Nurseries' FarWest Show Seminars to 276 industry members. Portland, OR. (August)
50. Mathers, H.M. 2007. Herbicide injury in ornamentals. Presented at OSU Extension and ODA Recertification Conference to 265 university and government officials. Perrysburg, OH. (February 8)
51. Mathers, H.M. 2007. Taking control of landscape weeds. Presented at New England Grows to 1,500 industry members. Boston, MA. (February)
52. Mathers, H.M. 2006. Ornamental weed control strategies. Presented at Ohio Turfgrass Conference and Show to 20 industry members. Columbus, OH. (December)
53. Mathers, H.M. 2006. Field evaluation of herbicide and mulch combinations for ornamental weed control. Presented at Weed Science Society of America to 55 professional society members. New York, NY. (February)
54. Mathers, H.M. 2006. Herbicide treated mulch. Presented at Weed Science Society of America to 55 professional society members. New York, NY. (February)
55. Mathers, H.M. 2006. Effective Container weed control: Going beyond chemicals. Presented at New England Grows to 250 industry members. Boston, MA. (February)
56. Mathers, H.M. 2006. What's new in ornamental weed control? Presented at ONLA's Central Environmental Nursery Trade Show and OSU Nursery Short Course to 250 industry members. Columbus, OH. (January)

57. Mathers, H.M. 2006. Weed control in herbaceous perennial landscape beds. Presented at ONLA's Central Environmental Nursery Trade Show and OSU Nursery Short Course to 150 industry members. Columbus, OH. (January)
58. Mathers, H.M. 2006. Overwintering plant material: The latest research. Presented at ONLA's Central Environmental Nursery Trade Show and OSU Nursery Short Course to 75 industry members. Columbus, OH. (January)
59. Mathers, H.M. 2005. Bed weed control in landscapes. Presented at Ohio Turfgrass Conference and Show to 150 industry members. Columbus, OH. (December)
60. Mathers, H.M. 2005. Issues in ornamental weed control. Presented at Valent USA Greenhouse and Nursery Plant Management Workshop to 25 invited industry members. Grand Tetons, MT. (June)
61. Mathers, H.M. 2005. Technical information requirements for Hispanic nursery employees – Survey results from Oregon and Ohio. Presented at Outreach Scholarship Conference 2004 to 100 university officials. Athens, GA. (October)
62. Mathers, H.M. 2005. A review of soil media: A place to stand and a place to grow. Presented at ONLA's Central Environmental Nursery Trade Show and OSU Nursery Short Course to 60 industry members. Columbus, OH. (January)
63. Mathers, H.M. 2005. Nutrition of woody plants. Presented at ONLA's Central Environmental Nursery Trade Show and OSU Nursery Short Course to 60 industry members. Columbus, OH. (January)
64. Mathers, H.M. 2005. New and difficult weeds in the nursery. Presented at ONLA's Central Environmental Nursery Trade Show and OSU Nursery Short Course to 60 industry members. Columbus, OH. (January)
65. Mathers, H.M. 2005. Is your herbicide working? An overview of herbicides in the landscape. Presented at ONLA's Central Environmental Nursery Trade Show and OSU Nursery Short Course to 60 industry members. Columbus, OH. (January)

Regional (Multi-state)

1. Mathers, H.M. 2012. Container nursery weeds control. Presented at Great Lakes Trade Exposition to 75 industry members. Grand Rapids, MI. (January 9)
2. Mathers, H.M. 2014. Restoring Woodlands to the Urban Landscape. Tri-State Green Industry Conference. Cincinnati, OH. Presented to 90 attendees (Feb. 6, 2014).
3. Mathers, H.M. 2014. Landscape Weed Control. Tri-State Green Industry Conference. Cincinnati, OH. Presented to 90 attendees (Feb. 6, 2014).
4. Mathers, H.M. 2014. Weeds Just Want to Have Fun. Pesticide Recertification Program. Chesapeake Green. Maryland Nursery and Landscape Association. Linthicum, MA. Presented to 100 attendees (Feb. 21, 2014).
5. Mathers, H.M. 2013. Sustainable Landscape Weed Control. Pesticide Recertification Program. Chesapeake Green. Maryland Nursery and Landscape Association. Linthicum, MA. Presented to 100 attendees (Feb. 21, 2014).

6. Mathers, H.M. 2013. Weed Identification Nursery and Landscape. MI Macomb Co, Pesticide Recertification Program. Macomb Co., MI. (Dec. 16, 2013).
7. Mathers, H.M. 2013. Herbicide Injury. MI Macomb Co, Pesticide Recertification Program. Macomb Co., MI. (Dec. 16, 2013).
8. Mathers, H.M. 2013. Herbicide Treated Mulch. MI Macomb Co, Pesticide Recertification Program. Macomb Co., MI. (Dec. 16, 2013).
9. Mathers, H.M. 2103. Born to be Wild: Controlling Landscape Weeds, Strategies & BMPs. MI Macomb Co, Pesticide Recertification Program. Macomb Co., MI. (Dec. 16, 2013).
10. Mathers, H.M. 2013. Weed Identification Nursery and Landscape. Presented at 27th Annual Summer Field Day to industry members. Danville, IN. (August 22).
11. Mathers, H.M. 2013. Sustainable Landscape Weed Management. Presented at 27th Annual Summer Field Day to industry members. Danville, IN. (August 23).
12. Mathers, H.M. 2013. Nursery field weed control. Presented at MSUE – West MI Weed Workshop. West Olive, MI. (February 29).
13. Mathers, H.M. 2013. Alternative ornamental weed control. Presented at MSUE – West MI Weed Workshop. West Olive, MI. (February 29).
14. Mathers, H.M. 2013. Container weeds control. Presented at MSUE – East MI Weed Workshop. Ann Arbor, MI. (February 29).
15. Mathers, H.M. 2013. Famous Landscape Weeds. Presented at MD, DC, and VA Landscape Contractors Association's Pesticide Recertification Conference to 325 industry members. Chevy Chase, MD. (February 14).
16. Mathers, H.M. 2013. Herbicide Mode of Action. Presented at MD, DC, and VA Landscape Contractors Association's Pesticide Recertification Conference to 325 industry members. Chevy Chase, MD. (February 14).
17. Bigger, M. and Mathers, H.M. 2013. Current environmental concerns, tree stress and sustainability. Tri-State Green Industry Conference. Sharonville, OH. (Feb. 7)
18. Mathers, H.M. 2013. Alternative Weed Control. Indiana Green Expo. Indianapolis, IN. (Jan. 10).
19. Mathers, H.M. 2013. Container Weed Control. Indiana Green Expo. Indianapolis, IN. (Jan. 10).
20. Mathers, H.M. 2012. Landscape Weed Control. Presented at 26th Annual Summer Field Day to industry members. Danville, IN. (August 23)
21. Mathers, H.M. 2012. Herbicide MOAs Why You Should Know. Presented at 26th Annual Summer Field Day to industry members. Danville, IN. (August 23)
22. Mathers, H.M. 2012. Restoring the woodlands into urban landscapes. Presented at the Cincinnati Zoo's Sustainable Landscape Program to 100 industry members. Cincinnati, OH. (February 29).
23. Mathers, H.M. 2012. Sustainable weed control. Presented at the Cincinnati Zoo's Sustainable

Landscape Program to 100 industry members. Cincinnati, OH. (February 29).

24. Mathers, H.M. 2012. Weed control in Christmas tree plantations. Presented to Ohio Christmas Tree Association to 100 industry members. Columbus, OH. (January 21)
25. Mathers, H.M. 2012. The potential of Roundup injury. Presented to Ohio Produce and Marketing Association to 75 industry members. Sandusky, OH. (January 17)
26. Mathers, H.M. 2012. Why I fail at weed control. Presented to Ohio Produce and Marketing Association to 80 industry members. Sandusky, OH. (January 16)
27. Mathers, H.M. 2012. Container nursery weeds control. Presented at Great Lakes Trade Exposition to 75 industry members. Grand Rapids, MI. (January 9)
28. Mathers, H.M. 2012. "What the World Needs Now:" Increasing Urban Tree Survival. Presented at Great Lakes Trade Exposition to 150 industry members. Grand Rapids, MI. (January 9)
29. Mathers, H.M. 2011. Landscape bed weed control: What's new! Presented to Ohio Turfgrass Foundation to 120 industry members. Columbus, OH. (December)
30. Mathers, H.M. 2011. Nursery weeds control. Presented at BFG Supply Co. Horticulture Expo to 15 industry members. Minneapolis, MN. (August 30)
31. Mathers, H.M. 2011. Understanding fertility in nursery and landscape. Presented at BFG Supply Co. Horticulture Expo to 20 industry members. Minneapolis, MN. (August 30)
32. Mathers, H.M. 2011. Going greener. Presented at MD, DC, and VA Landscape Contractors Association's Pesticide Recertification Conference to 375 industry members. Chevy Chase, MD. (February 24)
33. Mathers, H.M. 2011. Thin skinned trees. Presented at MD, DC, and VA Landscape Contractors Association's Pesticide Recertification Conference to 375 industry members. Chevy Chase, MD. (February 24)
34. Mathers, H.M. 2011. Nursery field weed control. Presented at MSUE – East MI Weed Workshop to 30 university officials. Ann Arbor, MI. (February 15)
35. Mathers, H.M. 2011. Alternative ornamental weed control. Presented at MSUE – East MI Weed Workshop to 30 university officials. Ann Arbor, MI. (February 15)
36. Mathers, H.M. 2011. Nursery field weed control. Presented at MSUE – West MI Weed Workshop to 96 university officials. West Olive, MI. (February 14)
37. Mathers, H.M. 2011. Alternative ornamental weed control. Presented at MSUE – West MI Weed Workshop to 96 university officials. West Olive, MI. (February 14)
38. Mathers, H.M. 2011. Container weeds control. Presented at MSUE – East MI Weed Workshop to 30 university officials. Ann Arbor, MI. (February 10)
39. Mathers, H.M. 2011. Container weeds control. Presented at MSUE – West MI Weed Workshop to 96 university officials. West Olive, MI. (February 9)
40. Mathers, H.M. 2011. All Gods weeds: Vascular and non-vascular. Presented at Great Lakes Trade

Exposition to 50 industry members. Grand Rapids, MI. (January 10)

41. Mathers, H.M. 2010. Managing and controlling weeds in landscape ornamentals using BMP's and herbicides. Presented to Ohio Turfgrass Foundation to 45 industry members. Columbus, OH. (December 9)
42. Mathers, H.M. 2010. More bark to your bite – Bio-treated herbicide mulch. Presented to Ohio Turfgrass Foundation to 45 industry members. Columbus, OH. (December 9)
43. Mathers, H.M. 2010. More bite to bark. Presented at 24th Annual Summer Field Day to 75 industry members. Danville, IN. (August 26)
44. Mathers, H.M. 2010. Your trees on crack. Presented at 24th Annual Summer Field Day to 75 industry members. Danville, IN. (August 26)
45. Mathers, H.M. 2010. Ornamental weed control: Green vs. greener. Presented at Michigan Green Industry Association Trade show and Convention to 50 industry members. Novi, MI. (March 3)
46. Mathers, H.M. 2010. Ornamental weed control: The "cide" in herbicide. Presented at Michigan Green Industry Association Trade show and Convention to 65 industry members. Novi, MI. (March 3)
47. Mathers, H.M. 2010. Your trees on crack. Presented at Iowa State University Shade Tree Short Course and Iowa Nursery Landscape Association Conference and Trade Show to 75 university officials. Ames, IA. (February 26)
48. Mathers, H.M. 2010. Greening the highways. Presented at Iowa State University Shade Tree Short Course and Iowa Nursery Landscape Association Conference and Trade Show to 75 university officials. Ames, IA. (February 26)
49. Mathers, H.M. 2010. More bite to bark. Presented at Iowa State University Shade Tree Short Course and Iowa Nursery Landscape Association Conference and Trade Show to 65 university officials. Ames, IA. (February 26)
50. Mathers, H.M. 2010. Greening the highways. Presented at Iowa State University Shade Tree Short Course and Iowa Nursery Landscape Association Conference and Trade Show to 60 university officials. Ames, IA. (February 25)
51. Mathers, H.M. 2010. More bite to bark. Presented at Iowa State University Shade Tree Short Course and Iowa Nursery Landscape Association Conference and Trade Show to 60 university officials. Ames, IA. (February 25)
52. Mathers, H.M. 2010. Your trees on crack. Presented at Iowa State University Shade Tree Short Course and Iowa Nursery Landscape Association Conference and Trade Show to 65 university officials. Ames, IA. (February 25)
53. Mathers, H.M. 2010. Your trees on crack, or split happens. Presented at Purdue University's Professional Land Management School to 225 industry members. Evansville, IN. (January 28)
54. Mathers, H.M. 2010. More bite to bark: Herbicide treated mulch. Presented at Purdue University's Professional Land Management School to 225 industry members. Evansville, IN. (January 28)
55. Mathers, H.M. 2010. Choosing the right herbicide. Presented at Great Lakes Trade Exposition to 200 industry members. Grand Rapids, MI. (January 4)

56. Mathers, H.M. 2009. Weed control and best herbicide management strategies for landscape beds. Presented to Ohio Turfgrass Foundation to 125 industry members. Columbus, OH. (December 8)
57. Mathers, H.M. 2009. Bark splitting and apple trees in NY. Presented at Cornell University Extension to 10 university officials. Appleton, NY. (July)
58. Mathers, H.M. 2009. Reduce, reuse, and recycle. Presented to Maryland Landscape Contractors Association to 350 industry members. Salisbury, MD. (February 13)
59. Mathers, H.M. 2009. More bite to bark. Presented at Maryland Landscape Contractors Association to 350 industry members. Salisbury, MD. (February 13)
60. Mathers, H.M. 2009. Your trees on crack. Presented to Maryland Landscape Contractors Association to 350 industry members. Salisbury, MD. (February 12)
61. Mathers, H.M. 2009. Your trees on crack. Presented to MD, DC, and VA Landscape Contractors Association to 375 industry members. Rockville, MD (January 21)
62. Mathers, H.M. 2009. More bite to bark. Presented to MD, DC, and VA Landscape Contractors Association to 375 industry members. Rockville, MD. (January 21)
63. Mathers, H.M. 2009. Abiotic factors influencing container growth. Presented at Indiana Green Expo to 100 industry members. Indianapolis, IN. (January 13)
64. Mathers, H.M. 2009. Container weeds control. Presented at Indiana Green Expo to 150 industry members. Indianapolis, IN. (January 13)
65. Mathers, H.M. 2009. Tree Liner Production I. Presented at Kentucky Nursery and Landscape Association Conference to 10 industry members. Louisville, KY. (January 12)
66. Mathers, H.M. 2009. Tree Liner Production II. Presented at Kentucky Nursery and Landscape Association Conference to 20 industry members. Louisville, KY. (January 12)
67. Mathers, H.M. 2009. Tree Liner Production III. Presented at Kentucky Nursery and Landscape Association Conference to 10 industry members. Louisville, KY. (January 12)
68. Mathers, H.M. 2009. Bark cracking. Presented at Great Lakes Trade Exposition to 100 industry members. Grand Rapids, MI. (January 6)
69. Mathers, H.M. 2009. Reduce, reuse, and recycle. Presented at Great Lakes Trade Exposition to 120 industry members. Grand Rapids, MI. (January 5)
70. Mathers, H.M. 2008. Non-chemical weed control methods for landscape beds. Presented to Ohio Turfgrass Foundation to 70 industry members. Columbus, OH. (December)
71. Mathers, H.M. 2008. New developments and best herbicide management. Presented to Ohio Turfgrass Foundation to 125 industry members. Columbus, OH. (December)
72. Mathers, H.M. 2008. Split happens! Trees and the crack problem. Presented at OSU North Central Diagnostic Network Regional Meeting to 25 university officials. Columbus, OH. (April 1)

73. Mathers, H.M. 2008. Know the "cide" in herbicide. Presented at Pennsylvania Landscape and Nursery Conference to 100 industry members. State College, PA. (February 14)
74. Mathers, H.M. 2008. Reduce, reuse & recycle: Ornamental weed control. Presented at Pennsylvania Landscape and Nursery Conference to 100 industry members. State College, PA. (February 13)
75. Mathers, H.M. 2008. Changing face of agriculture. Presented at Pennsylvania Landscape and Nursery Conference to 100 industry members. State College, PA. (February 13)
76. Mathers, H.M. 2008. Weed control in containers. Presented at Great Lakes Trade Exposition to 75 industry members. Grand Rapids, MI. (January)
77. Mathers, H.M. 2007. Nutrition of container plants. Presented at Indiana Green Expo to 65 industry members. Indianapolis, IN. (January)
78. Mathers, H.M. 2007. Weed management in nurseries. Presented at Indiana Green Expo to 80 industry members. Indianapolis, IN. (January)
79. Mathers, H.M. 2006. Environmental horticulture. Presented at OSU 1st HCS Graduate Research Retreat to 40 university officials and students. Columbus, OH. (October)
80. Mathers, H.M. 2006. Tree liner production in retractable roof greenhouses. Presented at Pennsylvania Landscape and Nursery Conference to 27 industry members. Atlantic City, NJ. (July)
81. Mathers, H.M. 2006. Weed Control in Landscape: Choosing the right herbicide. Presented at Great Lakes Trade Exposition to 105 industry members. Grand Rapids, MI. (January)
82. Mathers, H.M. 2006. Weed control in container nurseries: More than chemicals. Presented at Great Lakes Trade Exposition to 75 industry members. Grand Rapids, MI. (January)
83. Mathers, H.M. 2006. Weed control in field nurseries: Something old, something new. Presented at Great Lakes Trade Exposition to 65 industry members. Grand Rapids, MI. (January)
84. Mathers, H.M. 2005. Weed control in landscapes: Choosing the right herbicide. Presented at Indiana Nursery and Landscape Association Professional Landscape and Nursery Trade Show to 250 industry members. Indianapolis, IN. (January)
85. Mathers, H.M. 2005. Understanding failures in ornamental weed control. Presented at Indiana Nursery and Landscape Association Professional Landscape and Nursery Trade Show to 250 industry members. Indianapolis, IN. (January)
86. Mathers, H.M. 2005. Herbicide resistance in ornamentals. Presented at Kentucky Landscape Industries Winter Conference and Trade Show to 100 industry members. Louisville, KY. (January)
87. Mathers, H.M. 2005. Ornamental weed control: The latest research. Presented at Kentucky Landscape Industries Winter Conference and Trade Show to 125 industry members. Louisville, KY. (January)
88. Mathers, H.M. 2005. Herbicide resistance in ornamentals. Presented at Kentucky Landscape Industries Winter Conference and Trade Show to 100 industry members. Louisville, KY. (January)
89. Mathers, H.M. 2005. Trends: Is the way you do business changing? Presented at Kentucky

Landscape Industries Winter Conference and Trade Show to 40 industry members. Louisville, KY.
(January)

State

1. Mathers, H.M. 2014. Sustainable Landscape Weed Control. BASF – Chemical Program. East Lansing, MI. Presented to 75 attendees (Mar. 11, 2014).
2. Mathers, H.M. 2014. Sustainable Landscape Weed Control. BASF – Chemical Program. Gaylord, MI. Presented to 75 attendees (Mar. 13, 2014).
3. Mathers, H.M. 2014. Landscape Weed Control. BASF – Chemical Program. Indianapolis, IN. Presented to 75 attendees (Mar. 5, 2014).
4. Mathers, H.M. 2014. Update on Weed Control in Field and Landscape Beds. MNLA weed workshop. Holland, MI Presented to 70 attendees (Mar. 4, 2014).
5. Mathers, H.M. 2014. Update on Weed Control in Nursery Containers. MNLA weed workshop. Holland, MI Presented to 70 attendees (Mar. 4, 2014).
6. Mathers, H.M. 2014. Update on Weed Control in Ornamentals. Pesticide Safety In-service. Columbus, OH. Presented to 65 attendees (Jan. 8, 2014).
7. Mathers, H.M. 2014. You're Feeding Them What? Ohio Christmas tree Annual Meeting. Newark, OH. Presented to 105 attendees (Jan. 18, 2014).
8. Mathers, H.M. 2013. Herbicide Injury. Presented at Vegetation Recertification Program 2013 Ohio Public Works Expo. Columbus, OH (Sept. 18).
9. Mathers, H.M. 2013. Herbicide treated mulch. Presented at OSU Extension and ODA Recertification Conference 2013 to 600 industry members and university and government officials. Sandusky, OH. (March 20).
10. Mathers, H.M. 2013. Herbicide damage to trees. Presented at OSU Extension and ODA Recertification Conference 2013 to 500 industry members and university and government officials. Sandusky, OH. (March 20).
11. Mathers, H.M. 2013. Herbicide treated mulch. Presented at OSU Extension and ODA Recertification Conference 2013 to 450 industry members and university and government officials. Columbus, OH. (March 5).
12. Mathers, H.M. 2013. Herbicide damage. Presented at OSU Extension and ODA Recertification Conference 2013 to 450 industry members and university and government officials. Columbus, OH (March 5).
13. Mathers, H.M. 2013. Herbicide treated mulch. Presented at OSU Extension and ODA Recertification Conference 2013 to 450 industry members and university and government officials. Akron, OH (February 13).
14. Mathers, H.M. 2013. Herbicide damage. Presented at OSU Extension and ODA Recertification Conference 2013 to 450 industry members and university and government officials. Akron, OH (February 13).

15. Mathers, H.M. 2013. Herbicide treated mulch. Presented at OSU Extension and ODA Recertification Conference 2013 to 450 industry members and university and government officials. Dayton, OH (Jan. 31).
16. Mathers, H.M. 2013. Herbicide damage. Presented at OSU Extension and ODA Recertification Conference 2013 to 450 industry members and university and government officials. Dayton, OH (Jan. 31).
17. Mathers, H.M. 2012. Weed control update for nurseries – Container and field trials. Presented at 2012 Summer Nursery Discussions. West Olive, MI. (August 9)
18. Mathers, H.M. 2012. Shocked or Not. Presented at Michigan Nursery and Landscape Association's Urban Tree Survival Workshop to 20 industry members. East Lansing, MI. (March 13)
19. Mathers, H.M. 2012. Understanding landscape fertilizing. Presented at Michigan Nursery and Landscape Association's Urban Tree Survival Workshop to 20 industry members. East Lansing, MI. (March 13)
20. Mathers, H.M. 2012. New approaches and products: Ornamental weed control. Presented at Michigan Nursery and Landscape Association's Urban Tree Survival Workshop to 20 industry members. East Lansing, MI. (March 13)
21. Mathers, H.M. 2012. Basics of Weed ID. Presented at Michigan Nursery and Landscape Association's Weed Workshop to 20 industry members. East Lansing, MI. (March 13)
22. Mathers, H.M. 2012. Herbicide treated mulch. Presented at OSU Extension and ODA Recertification Conference 2012 to 450 industry members and university and government officials. Columbus, OH. (March 8)
23. Mathers, H.M. 2012. Herbicide damage to trees. Presented at OSU Extension and ODA Recertification Conference 2012 to 450 industry members and university and government officials. Columbus, OH. (March 8)
24. Mathers, H.M. 2012. Herbicide treated mulch. Presented at OSU Extension and ODA Recertification Conference 2012 to 540 industry members and university and government officials. Dayton, OH. (February 15)
25. Mathers, H.M. 2012. Herbicide damage to trees. Presented at OSU Extension and ODA Recertification Conference 2012 to 476 industry members and university and government officials. Dayton, OH. (February 15)
26. Mathers, H.M. 2012. Herbicide treated mulch. Presented at OSU Extension and ODA Recertification Conference 2012 to 620 industry members and university and government officials. Akron, OH. (February 8)
27. Mathers, H.M. 2012. Herbicide damage to trees. Presented at OSU Extension and ODA Recertification Conference 2012 to 610 industry members and university and government officials. Akron, OH. (February 8)
28. Mathers, H.M. 2012. Herbicide treated mulch. Presented at OSU Extension and ODA Recertification Conference 2012 to 600 industry members and university and government officials. Sandusky, OH. (January 31)

29. Mathers, H.M. 2012. Herbicide damage to trees. Presented at OSU Extension and ODA Recertification Conference 2012 to 500 industry members and university and government officials. Sandusky, OH. (January 31)
30. Mathers, H.M. 2011. Crop safety update in nursery. Presented at Willowbrook Nursery to 50 industry members. Avon, OH. (September 28)
31. Mathers, H. M. 2011. Weed control update. Presented at BASF to 60 industry members. Mentor, OH. (September 15)
32. Mathers, H.M. 2011. Trial report at Northland Farms. Presented at MSUE Bus Tour of Weed Research Trials to 42 university officials. West Olive, MI. (August 17)
33. Mathers, H.M. 2011. Trials at BFN. Presented at MSUE Bus Tour of Weed Research Trials to 42 university officials. West Olive, MI. (August 17)
34. Mathers, H.M. 2011. Weed control update for nurseries. Presented at 2011 Summer Nursery Discussions to 35 university officials. West Olive, MI. (July 7)
35. Mathers, H.M. 2011. What the world needs now. Presented at Summit County Workshop to 40 industry members. Richfield, OH. (March 26)
36. Mathers, H.M. 2011. Bark splitting herbicide injury. Presented at OSU Extension and ODA Recertification Conference 2011 to 300 industry members and university and government officials. Columbus, OH. (March 9)
37. Mathers, H.M. 2011. Landscape weed control. Presented at OSU Extension and ODA Recertification Conference 2011 to 300 industry members and university and government officials. Columbus, OH. (March 9)
38. Mathers, H.M. 2011. Bark splitting herbicide injury. Presented at OSU Extension and ODA Recertification Conference 2011 to 420 industry members and university and government officials. Akron, OH. (March 2)
39. Mathers, H.M. 2011. Landscape weed control. Presented at OSU Extension and ODA Recertification Conference 2011 to 420 industry members and university and government officials. Columbus, OH. (March 2)
40. Mathers, H.M. 2011. Managing and controlling weeds in landscape ornamentals with herbicides. Presented at Buckeye Power Sales Turf Clinic to 65 industry members. Columbus, OH. (February 18)
41. Mathers, H.M. 2011. Bark splitting herbicide injury. Presented at OSU Extension and ODA Recertification Conference 2011 to 420 industry members and university and government officials. Dayton, OH. (February 16)
42. Mathers, H.M. 2011. Landscape weed control. Presented at OSU Extension and ODA Recertification Conference 2011 to 420 industry members and university and government officials. Dayton, OH. (February 16)
43. Mathers, H.M. 2011. Bark splitting herbicide injury. Presented at OSU Extension and ODA Recertification Conference 2011 to 300 industry members and university and government officials. Sandusky, OH. (January 11)

44. Mathers, H.M. 2011. Landscape weed control. Presented at OSU Extension and ODA Recertification Conference 2011 to 420 industry members and university and government officials. Sandusky, OH. (January 11)
45. Mathers, H.M. 2010. Weed control update for nurseries. Presented at 2010 Summer Nursery Discussions to 35 university officials. West Olive, MI. (July 22)
46. Mathers, H.M. 2010. Weeds diagnostic update. Presented at Summit County Workshop to 25 university officials. Richfield, OH. (March 26)
47. Mathers, H.M. 2008. Your trees on crack: Glyphosate and bark cracking in woody ornamentals. Presented at Purdue University Horticulture Department Seminar to 60 university officials. Lafayette, IN. (October 16)
48. Mathers, H.M. 2008. Learning more about migrant labor. Presented at OSU Extension Legislative Luncheon to 150 university and extension officials. Columbus, OH. (April 2)
100% Speaker at booth; Program was highlighted in Extension Empowerment through Education
49. Mathers, H.M. 2008. Herbicide injury in ornamentals. Presented at OSU Extension and ODA Recertification Conference 2006-2007 to 300 industry members and university and government officials. Columbus, OH. (February 26)
50. Mathers, H.M. 2008. Ornamental bed weed control and product updates. Presented at Buckeye Power Sales Turf Clinic to 100 industry members. Dublin, OH. (February 4)
51. Mathers, H.M. 2008. How herbicides work, MOA. Presented at Summit County Workshop to 15 university and extension officials. Akron, OH. (February 1)
52. Mathers, H.M. 2008. Herbicide injury in ornamentals. Presented at OSU Extension and ODA Recertification Conference 2007-2008 to 300 industry members and university and government officials. Dayton, OH. (January 15)
53. Mathers, H.M. 2007. Herbicide injury in ornamentals. Presented at OSU Extension and ODA Recertification Conference 2007-2008 to 270 industry members and university and government officials. Akron, OH. (November 20)
54. Mathers, H.M. 2007. Weed control in landscape ornamentals: Choosing the right herbicide. Presented at Green Velvet Sod Farms Lawn Care and Turf Management Program to 105 industry members. Beavercreek, OH. (November 15)
55. Mathers, H.M. 2007. Research at OSU in ornamentals: Liner production, weeds, plant nutrition, heat stress. Presented at OSU Extension Cuyahoga County Master Gardeners Program to 35 university and extension officials. Cleveland, OH. (September)
56. Mathers, H.M. 2007. 5 basic weeds and their controls. Presented at 10th Annual Northwest Ohio Green Industry Summer Session at Owens Community College to 50 university and extension officials. Toledo, OH. (August 1)
57. Mathers, H.M. 2007. Abiotic diseases and herbicide damage. Presented at 10th Annual Northwest Ohio Green Industry Summer Session at Owens Community College to 50 university and extension

officials. Toledo, OH. (August 1)

58. Mathers, H.M. 2007. Worth of the Ohio nursery / landscape industry. Presented at ODA, USDA, ONLA Statisticians and Managers Meeting to 15 government officials and industry members. Reynoldsburg, OH. (May 31)
59. Mathers, H.M. 2007. Herbicide injury in ornamentals. Presented at OSU Extension and ODA Recertification Conference 2006-2007 to 200 industry members and university and government officials. Columbus, OH. (February 27)
60. Mathers, H.M. 2007. Invasive plants and control. Presented at OSU Extension Mahoning County to 75 university and extension officials. Youngstown, OH. (February 22)
61. Mathers, H.M. 2007. Ornamental bed weed control and product updates. Presented at Buckeye Power Sales Turf Clinic to 75 industry members. Dublin, OH. (February 5)
62. Mathers, H.M. 2007. Propagation - Effects of planting too deep. Presented at Rhode Island Nursery to 7 staff members. Warwick, RI. (February)
63. Mathers, H.M. 2006. Herbicide injury. Presented at Ohio Pesticide Commercial Applicator Recertification Conference Southwest to 400 industry members and university and government officials. Wilmington, OH. (December)
64. Mathers, H.M. 2006. Ornamental weed control research. Presented at Miami Valley Green Industry Conference to 150 industry members and university and government officials. Dayton, OH. (December)
65. Mathers, H.M. 2006. Herbicide injury. Presented at Ohio Pesticide Commercial Applicator Recertification Conference Northeast to 400 industry members and university and government officials. Akron, OH. (November)
66. Mathers, H.M. 2006. Sense and sensibility – Tree liner production in retractable roof greenhouses. Presented at 6th Joint OSU and ONLA Research Day to 65 university officials. Columbus, OH. (October)
67. Mathers, H.M. 2006. Herbicide injury in ornamentals. Presented at SU Extension 60th Ohio Plant Diagnostic Workshop to 60 university officials. Wooster, OH. (October)
68. Mathers, H.M. 2006. Nutrient deficiencies in ornamentals. Presented at OSU Extension 60th Ohio Plant Diagnostic Workshop to 60 university officials. Wooster, OH. (October)
69. Mathers, H.M. 2006. Through the roof. Presented at Wholesale Nursery Growers of America and American Nursery and Landscape Association Kick the Dirt Tour and Talks to 180 industry members. Mentor, OH. (September)
70. Mathers, H.M. 2006. Industrial vegetation control. Presented at OSU Extension New Applicator Training for Commercial Applicators to 30 university officials. Columbus, OH. (March)
71. Mathers, H.M. 2006. Extension outreach trains Hispanic workforce. Presented at OSU Agriculture Vice President's Cabinet to 15 university officials. Reynoldsburg, OH. (March)
72. Mathers, H.M. 2006. Field planting of trees and shrubs: Baby's first year. Presented at OSU Extension Master Gardener Training Program to 50 university officials. Columbus, OH. (February)

73. Mathers, H.M. 2006. Tree nutrition and fertilizer: Don't go there. Presented at OSU Extension Master Gardener Training Program to 50 university officials. Columbus, OH. (February)
74. Mathers, H.M. 2006. Pruning principles. Presented at OSU Extension Master Gardener Training Program to 50 university officials. Columbus, OH. (February)
75. Mathers, H.M. 2006. Weed research update and new herbicides. Presented at OSU Extension Lake County Nursery Program to 40 university officials. Perry, OH. (February)
76. Mathers, H.M. 2006. Ornamental weed control. Presented at Ohio Pesticide Commercial Applicator Recertification Conference Central to 200 industry members and university and government officials. Columbus, OH. (February)
77. Mathers, H.M. 2006. Ornamental weed control. Presented at Ohio Pesticide Commercial Applicator Recertification Conference Southwest to 175 industry members and university and government officials. Dayton, OH. (February)

Other Presentations

National

1. Mathers, H. 2013. Herbicide Trials Ohio. NE Weed Science Society. Baltimore, MD (February 6).
2. Mathers, H. and L. Case. 2013. Liverwort Trials MI. NE Weed Science Society. Baltimore, MD (February 6).
50% Contributor to Research Associate Presentation.
3. Bigger, M. and H. Mathers. 2013. Greening the highways: Outplant survival of deciduous trees in stressful environments. Horticulture and Crop Science Graduate Research Retreat. Columbus OH. 35% Contributor to Graduate Student Presentation
4. Mathers, H.M. & M.M. Bigger. 2013. Ornamental weed control with bio-herbicides and bio-rational approaches. Poster. Northeastern Weed Science Society annual meeting. Baltimore, MD. Feb. 4-7. 70% Contributor along with Graduate Student assistance
5. Bigger, M & H. Mathers. 2013. Greening the highways: 401 & Allen Road. Presentation. Urban Tree Growth & Longevity Working Group Field Trip. Toronto, Ontario Canada. August 13. 35% Contributor to Graduate Student Presentation
6. Case, L. and Mathers, H.M. 2011. Phytotoxicity effects of several liverwort products. Presented at American Society for Horticultural Science to 30 professional society members. Waikalea, Hawaii. (September 27)
50% Contributor to Research Associate Presentation
7. Bigger, M. and H. Mathers. 2012. Greening the highways: Outplant survival of deciduous trees in stressful environments. Presented at American Society for Horticultural Science Annual Conference to 30 professional society members. Waikalea, Hawaii. (September 26).
35% Contributor to Graduate Student Presentation
8. Mathers, H.M. 2011. Bio herbicide treated mulches. Presented at American Society for Horticultural Science Annual Conference to 30 professional society members. Waikalea, Hawaii. (September 26)
9. Johnson, D. and Mathers, H.M. 2011. The price is wrong. Presented at American Society for

Horticultural Science Annual Conference to 30 professional society members. Waikelea, Hawaii.
(September 26)
50% Contributor to Program Coordinator Presentation

10. Mathers, H.M. 2011. Technologies to shorten tree whip production. Presented at American Society for Horticultural Science Annual Conference to 30 professional society members. Waikelea, Hawaii. (September 26)
11. Mathers, H.M. 2011. Effects of planting depth. Presented at American Society for Horticultural Science Annual Conference to 30 professional society members. Waikelea, Hawaii. (September 25)
12. Mathers, H.M. 2011. Greening the highways. Presented at American Society for Horticultural Science Annual Conference to 30 professional society members. Waikelea, Hawaii. (September 25)
13. Mathers, H.M. 2011. Greening the highways. Presented at S-1051 Meeting to 20 university officials. St. Paul, MN. (July 15)
14. Mathers, H.M. 2010. Nursery field fertilizer evaluations in Ontario and Ohio. Presented at American Society for Horticultural Science to 65 professional society members. Palm Desert, CA. (August 3)
15. Gordon, P. and Mathers, H.M. 2010. Technology for improved tree liner production in Ontario, Canada. Presented at American Society for Horticultural Science to 30 professional society members. Palm Desert, CA. (August 3)
30% Contributor to Graduate Student Presentation
16. Rivera, D. and Mathers, H.M. 2010. Using retractable roof greenhouses and pot-in-pot systems for the development of double cropped tree liners. Presented at American Society for Horticultural Science to 30 professional society members. Palm Desert, CA. (August 4)
30% Contributor to Graduate Student Presentation
17. Mathers, H.M. 2010. Comparison of fertilizers using advance granule technology with industry standards. Presented at American Society for Horticultural Science to 25 professional society members. Palm Desert, CA. (August 3)
18. Mathers, H.M. 2009. "Greening the highways": Growing trees in RRG's. Session Chair. Presented at 2nd Joint VRIC, Guelph University, Landscape Ontario Horticultural Trades Association and Ohio State University Research Day to 75 industry members and university officials. Vineland Station, ON, Canada. (October 1)
19. Mathers, H.M. 2009. Summary of liner studies. Session Chair. Presented at 2nd Joint VRIC, Guelph University, Landscape Ontario Horticultural Trades Association and Ohio State University Research Day to 75 industry members and university officials. Vineland Station, ON, Canada. (October 1)
20. Daniel, K. and Mathers, H.M. 2009. Effect of herbicides and grass / groundcover on cold hardiness of field grown nursery stock. Presented at American Society for Horticultural Science to 65 professional society members. St. Louis, MO. (July)
30% Contributor to Graduate Student Presentation
21. Somireddy, U. and Mathers, H.M. 2009. Field evaluation of herbicide and mulch combinations for weed control efficacy. Presented at American Society for Horticultural Science to 65 professional society members. St. Louis, MO. (July)
30% Contributor to Graduate Student Presentation

22. Rivera, D. and Mathers, H.M. 2009. Accelerated tree whip production using retractable roof greenhouses. Presented at American Society for Horticultural Science to 65 professional society members. St. Louis, MO. (July)
30% Contributor to Graduate Student Presentation
23. Johnson, D. and Mathers, H.M. 2009. Evaluation of program changes with the Ohio State University Nursery Short Course. Presented at American Society for Horticultural Science to 65 professional society members. St. Louis, MO. (July)
30% Contributor to Program Coordinator Presentation
24. Mathers, H.M. 2009. New herbicide and mulch combination products. Presented at Northeastern Weed Science Society Conference to 65 professional society members. Baltimore, MD (January 8)
25. Mathers, H.M. 2009. Bark cracking. Presented at Northeastern Weed Science Society Conference to 65 professional society members. Baltimore, MD (January 8)
26. Daniel, K. and Mathers, H.M. 2009. Evaluation of glyphosate and bottom heat on nursery tree hardiness. Presented at Northeastern Weed Science Society Conference to 30 professional society members. Baltimore, MD. (January 8)
30% Contributor to Graduate Student Poster
27. Case, L. and Mathers, H.M. 2009. Trial results at the Ohio State University with dimethamid-p, dimethamid-p + pendimethalin, mesotrione G, and imazosulfuron. Presented at Northeastern Weed Science Society Conference to 30 professional society members. Baltimore, MD. (January 8)
30% Contributor to RA Poster
28. Mathers, H.M. 2008. Tree liner production in retractable roof greenhouses. Presented at The International Plant Propagators' Society, Eastern and Western Regions, North America, Combined Annual Meeting to 70 professional society members. Denver, CO. (October)
29. Bigger, M. and Mathers, H.M. 2008. Effects of dinitroaniline herbicides on root development in containers. Presented at The International Plant Propagators' Society, Eastern and Western Regions, North America, Combined Annual Meeting to 150 professional society members. Denver, CO. (October)
30% Contributor to Graduate Student Presentation
30. Somireddy, U. and Mathers, H.M. 2008. Field evaluation of herbicide and mulch combinations for weed control. Presented at The International Plant Propagators' Society, Eastern and Western Regions, North America, Combined Annual Meeting to 150 professional society members. Denver, CO. (October)
30% Contributor to Graduate Student Presentation
31. Case, L. and Mathers, H.M. 2008. Herbicide-treated mulches for ornamental weed control. Presented at The International Plant Propagators' Society, Eastern and Western Regions, North America, Combined Annual Meeting to 150 professional society members. Denver, CO. (October)
30% Contributor to Research Associate Presentation
32. Rivera, D. and Mathers, H.M. 2008. Accelerated whip production using retractable roof greenhouses. Presented at The International Plant Propagators' Society, Eastern and Western Regions, North America, Combined Annual Meeting to 150 professional society members. Denver, CO. (October)
30% Contributor to Graduate Student Presentation
33. Daniel, K. and Mathers, H.M. 2008. Effect of herbicides and grass/groundcover on cold hardiness of

field grown nursery stock. Presented at The International Plant Propagators' Society, Eastern and Western Regions, North America, Combined Annual Meeting to 150 professional society members. Denver, CO. (October)
30% Contributor to Graduate Student Presentation

34. Daniel, K. and Mathers, H.M. 2008. Evaluation of glyphosate and bottom heat on nursery tree hardiness. Presented at The International Plant Propagators' Society, Eastern and Western Regions, North America, Combined Annual Meeting to 150 professional society members. Denver, CO. (October)
30% Contributor to Graduate Student Presentation
35. Mathers, H.M. 2008. Summary of glyphosate and bark cracking. Session Chair. Presented at 1st Joint VRIC, Guelph University, Landscape Ontario Horticultural Trades Association and Ohio State University Research Day to 75 industry members and university officials. Vineland Station, ON, Canada. (October 7)
36. Case, L. and Mathers, H.M. 2008. IR-4 2008 trials and evaluations of sponsored research trials. Session Chair. Presented at 1st Joint VRIC, Guelph University, Landscape Ontario Horticultural Trades Association and Ohio State University Research Day to 75 industry members and university officials. Vineland Station, ON, Canada. (October 7)
40% Contributor to Research Associate Presentation
37. Mathers, H.M. 2008. Ornamental trials results from the VRIC. Session Chair. Presented at 1st Joint VRIC, Guelph University, Landscape Ontario Horticultural Trades Association and Ohio State University Research Day to 75 industry members and university officials. Vineland Station, ON, Canada. (October 7)
38. Daniel, K. and Mathers, H.M. 2008. Evaluation of glyphosate and bottom heat on nursery tree hardiness and field evaluation of glyphosate and bark cracking. Session Chair. Presented at 1st Joint VRIC, Guelph University, Landscape Ontario Horticultural Trades Association and Ohio State University Research Day to 75 industry members and university officials. Vineland Station, ON, Canada. (October 7)
30% Contributor to Graduate Student Presentation
39. Somireddy, U. and Mathers, H.M. 2008. Field evaluation of various herbicide and mulch combinations for ornamental weed control. Session Chair. Presented at 1st Joint VRIC, Guelph University, Landscape Ontario Horticultural Trades Association and Ohio State University Research Day to 75 industry members and university officials. Vineland Station, ON, Canada. (October 7)
30% Contributor to Graduate Student Presentation
40. Rivera, D. and Mathers, H.M. 2008. Development of a double crop production system in retractable roof houses. Session Chair. Presented at 1st Joint VRIC, Guelph University, Landscape Ontario Horticultural Trades Association and Ohio State University Research Day to 75 industry members and university officials. Vineland Station, ON, Canada. (October 7)
30% Contributor to Graduate Student Presentation
41. Mathers, H.M. 2008. Retractable roof greenhouse versus bare root tree liner post-harvest survival. Session Chair. Presented at 1st Joint VRIC, Guelph University, Landscape Ontario Horticultural Trades Association and Ohio State University Research Day to 75 industry members and university officials. Vineland Station, ON, Canada. (October 7)
42. Daniel, K. and Mathers, H.M. 2008. Effect of herbicides and grass / groundcover on cold hardiness of field grown nursery stock. Presented at American Society for Horticultural Science to 65 professional

- society members. Orlando, FL. (July)
30% Contributor to Graduate Student Presentation
43. Somireddy, U. and Mathers, H.M. 2008. Field evaluation of herbicide and mulch combinations for weed control efficacy. Presented at American Society for Horticultural Science to 65 professional society members. Orlando, FL. (July)
30% Contributor to Graduate Student Presentation
44. Daniel, K. and Mathers, H.M. 2008. Evaluation of glyphosate and bottom heat on nursery tree hardiness and field evaluation of glyphosate and bark cracking. Presented at Southern Nursery Association, Inc. 52nd Annual Research Conference to 70 industry members and university officials. Atlanta, GA. (August)
30% Contributor to Graduate Student Presentation
45. Mathers, H.M. 2008. Hispanic nursery multi-state survey. Presented at S-1021 Meeting to 20 university officials. Atlanta, GA. (August)
46. Mathers, H.M. 2008. Overview of OSU nursery research. Presented at WERA-58 to 20. Professional society members. Orlando, FL. (July)
47. Mathers, H.M. 2008. Accelerated tree whip production using retractable roof greenhouses. Presented at American Society for Horticultural Science to 65 professional society members. Orlando, FL. (July)
48. Mathers, H.M. 2007. Evaluation of herbicide treated mulches. Presented at Southern Nursery Association, Inc. 52nd Annual Research Conference to 150 industry members. Atlanta, GA. (August)
49. Case, L. and Mathers, H.M. 2007. Controlling liverwort and moss in overwintering containers of herbaceous perennials. Presented at Southern Nursery Association, Inc. 52nd Annual Research Conference to 150 industry members. Atlanta, GA. (August)
50% Contributor to Research Associate Presentation
50. Acuna, A. and Mathers, H.M. 2007. Multistate survey of nursery laborer level employees: a complex survey analysis. Presented at Southern Nursery Association, Inc. 52nd Annual Research Conference to 150 industry members. Atlanta, GA. (August)
30% Contributor to Graduate Student Presentation
51. Case, L. and Mathers, H.M. 2007. The Ohio State University Nursery Short Course. Presented at American Society for Horticultural Science to 10 professional society members. Scottsdale, AZ. (July)
30% Contributor to Research Associate Presentation
52. Case, L. and Mathers, H.M. 2007. Determination of optimum species for tree liner production in Ohio. Presented at American Society for Horticultural Science to 35 professional society members. Scottsdale, AZ. (July)
50% Contributor to Research Associate Presentation
53. Mathers, H.M. 2007. Bark cracking. Presented at American Society for Horticultural Science to 35 professional society members. Scottsdale, AZ. (July)
54. Acuna, A. and Mathers, H.M. 2007. Multistate survey of nursery laborer-level employees: Ohio, Michigan, Delaware, Tennessee, Florida, Indiana, Kentucky, Arizona and Rhode Island. Presented at American Society for Horticultural Science to 35 professional society members. Scottsdale, AZ. (July)
30% Contributor to Graduate Student Presentation

55. Bigger, M. and Mathers, H.M. 2007. Influence of DNA herbicides on cold hardiness during nursery field overwintering. Presented at American Society for Horticultural Science to 35 professional society members. Scottsdale, AZ. (July)
30% Contributor to Graduate Student Presentation
56. Case, L. and Mathers, H.M. 2006. Determination of the optimum species for Ohio tree liner production in retractable roof greenhouses. Presented at American Society for Horticultural Science to 65 professional society members. New Orleans, LA. (July)
30% Contributor to Research Associate Presentation
57. Acuna, A. and Mathers, H.M. 2006. Implementing and assessing a bilingual educational program for Hispanic nursery workers in Ohio. Presented at American Society for Horticultural Science to 65 professional society members. New Orleans, LA. (July)
30% Contributor to Graduate Student Presentation
58. Mathers, H.M. 2006. Training Hispanic nursery workers and multi-state survey. Presented at S-1021 Regional Working Group Meeting to 15 attendees. Mt. View, CA. (February)
59. Bigger, M. and Mathers, H.M. 2006. Effects of dinitroaniline herbicides in over-wintered containers. Presented at Northeastern Weed Science Society Conference 60th Annual Meeting to 55 professional society members. Providence, RI. (January)
20% Contributor to Graduate Student Presentation
60. Case, L. and Mathers, H.M. 2006. Possible new uses for old ornamental herbicides in over-wintered containers. Presented at Northeastern Weed Science Society Conference 60th Annual Meeting to 55 professional society members. Providence, RI. (January)
45% Contributor to Research Associate Presentation
61. Case, L. and Mathers, H.M. 2006. Possible new uses for old ornamental herbicides in over-wintered containers. Presented at Northeastern Weed Science Society Conference 60th Annual Meeting to 55 professional society members. Providence, RI. (January)
45% Contributor to Research Associate Presentation
62. Mathers, H.M. 2005. Oryzalin movement in one-gallon containers from spray oryzalin-treated mulch applications. Presented at American Society for Horticultural Science to 65 professional society members. New Orleans, LA. (July)
63. Mathers, H.M. 2005. Field evaluation of various herbicide and mulch combinations for ornamental weed control. Presented at American Society for Horticultural Science to 65 professional society members. New Orleans, LA. (July)
64. Bigger, M. and Mathers, H.M. 2005. Effects of dinitroaniline herbicides on root development in containers. Presented at Northeastern Weed Science Society Conference to 55 professional society members. Washington, DC. (January)
45% Contributor to Graduate Student Presentation
65. Mathers, H.M. 2005. Field evaluation of various herbicide and mulch combinations for ornamental weed control. Presented at Northeastern Weed Science Society Conference to 55 professional society members. Washington, DC. (January)

vii) *Potential Publications Under Review*

1. H.M. Mathers, K.M. Daniel, and N.J. Taylor. 201x. Bark cracking: Causes and influence of pruning,

tree guards, sucker removal, fertility and herbicides. HortTechnology. Assigned manuscript # 02349. 85% Authorship: Original concept, lead author of this paper, 90% of literature review. Submitted: 08/18/2012.

2. K.M. Daniel and H.M. Mathers. 201x. The role of glyphosate in tree bark cracking and cold hardiness. HortTechnology. Assigned manuscript # 02351. 30% Authorship, graduate student thesis advisor, assisted with research, organization, 35% content and editing. Submitted: 08/18/2012
3. Bigger, M., and H.M. Mathers. 201x. Root hardiness and overwintering woody ornamental container plants: Considerations, process and protection. HortTechnology #02350. 30% Authorship, graduate student thesis advisor, assisted with research, organization, 30% content and editing. Submitted: 08/18/2012
4. Case, L.T. and H.M. Mathers. 201x. Herbicide and mulch combinations for weed control in the landscape and field nurseries. Weed Technology WT-S-12-00139. 45% Authorship, applied for grant, principle investigator, editing 35%.

viii) Multi-media/databases/websites

I. Multimedia

- Mathers, H.M. (Technical source): John Rietman. Glyphosate drift can harm non-target plants. TurfNet.com. 2011. http://www.turfnet.com/view_news.php?obj_id=184
- Mathers, H.M. (Technical source): Lauren Hepler. Road Warriors. Columbus Dispatch. Metro and State Section B. June 17, 2011. pp. B1-2.
- Mathers, H.M. (Technical source): K. Kuhlman. Greening the highway project begins in Gahanna. This Week Community Newspapers. June 8, 2011. <http://www.thisweeknews.com/content/stories/gahanna/news/2011/06/08/greening-the-highways-project-begins-in-gahanna.html>.
- Mathers, H.M. (Technical source): P. Willis. State project to line roads with trees begins in Gahanna. Gahanna News. June 7, 2011. http://www.snponline.com/articles/2011/06/12/gahanna_news/news/ghplanting_20110607_0926am_6.txt.
- Mathers, H.M. (Technical source): Lehnert. R. Tips on How to Avoid Glyphosate Injury. April 2011. Washington State Fruit Commission. <http://www.goodfruit.com/Good-Fruit-Grower/April-15th-2011/Tips-on-how-to-avoid-glyphosate-damage>.
- Mathers, H.M. (Technical source): K. Kuhlman. Bi-national roadside-planting project begins in Gahanna. This Week Community Newspapers. June 2, 2011. <http://www.thisweeknews.com/content/stories/gahanna/news/2011/06/02/Binational-Greening-of-Highways-project-begins-in-Gahanna.html>.
- Mathers, H.M. (Technical source): Lehnert. R. Use Glyphosate with Caution. Good Fruit Grower. Sept. 2010. Washington State Fruit Commission. www.goodfruit.com/Good-Fruit-Grower/September-2010/Use-glyphosate-with-caution.
- Mathers, H.M. (Technical source): Alliance of Community Trees. Sponsored by Home Depot

Foundation. "Improper" Glyphosate Use May be Causing a Phenomena Known as Split Bark. actrees.org/site/news/newsroom/improper_glyphosate_use_may_be_causing_a_phen.php

- Rosenberger, D., Miranda Sazo, M., Mathers, H., Watkins, C. 2010. Potential Non-target Effects of Glyphosate on Apples. Vermont Apple IPM Alert. Pp. 1-5
orchard.uvm.edu/uvmapple/pest/IPMnews/2010/VermontAppleIPMAAlert08102010.pdf
- Mathers, H.M. (Technical source): Vanessa Farquaharson. The road to greener highways. National Post, Green Energy. Sept. 26, 2009.
- Mathers, H.M. (Technical source): Vineland Research and Innovation Centre and Landscape Ontario Celebrate Greening Ontario Highways with an Open House. Sept 3, 2009.
- Mathers, H.M. (Technical source): Marcia Passos Duffy. Turf. Bark Splitting: How to prevent glyphosate damage to young trees. May 2009.
- Mathers, H.M. (Technical source): Stanton Gill. TPM/IPM Weekly Report for Arborists, Landscape Managers and Nursery Managers. University of Maryland Cooperative Extension. Cracking of Nursery Trees. September 25, 2009.
- Mathers, H.M. (Technical source): Spencer Hunt. State nursery drops ash tree appeared in the Columbus Dispatch Metro and State Section, April 17, 2008. Pp. B1 & 2.
- Mathers, H.M. (Technical source): Learning more about migrant labor good for green industry business. 2008. Empowerment through education. Extension Conference. Flyer
- Mathers, H.M. (Technical source): Monique Curret. Multistate research with Spanish speakers appeared in the Columbus Dispatch Business Section, July 31, 2007. Pp. C7 & 10.
- Mathers, H.M. (Technical source): Karen Vance. OSU students use local business as classroom. Re: The 401.02 study tour class visiting Thornton Landscaping in Maineville, OH.
- Mathers, H.M. (Technical source): Candace Pollock. OSU extension survey sheds light on green industry labor force. www.ag.ohio-state.edu/~news/story; picked up by several sources including NMPPro magazine and circulated on their website.
- Mathers, H.M. (Technical source): Julia Harris. Nursery school bears fruit. November 16 on Campus. Vol. 36(8)
- Mathers, H.M. (Technical source): Tracy Powell. 2006. Weed-Out Test: Mulch + Herbicide = Long-term Weed Control? Turf Central. B10, 22
- Mathers, H. 2005. Validation. Technical Training in the Native Tongue. OSU Outreach and Engagement Making Waves Impact. Office of University Outreach and Engagement. P.21
- Mathers, H.M. (Technical source): Pollock, C. 2005. Tree Liners Give Purpose to Retractable Roof Greenhouses. OSU Agriculture. Vol. 14 (1): 4.
- Mathers, H.M. (Technical source): Pollock, C. 2005. Tree Liners Give Purpose to Retractable Roof Greenhouses. Country Folks Grower. Vol. 14 (4): 23.

II. Websites

The BasicGreen website was redesigned in 2010. The new website address is: basicgreen.osu.edu. This site has received over ¼ million hits, annually. BasicGreen contains the trade articles I have written (see sections Trade Publication Invited and regular column, below). Articles in BasicGreen are divided into key subject areas. Content - 98% Dr. Mathers, Webmaster: Mr. Luke Case (Dr. Mathers' Res. Assoc. II).

We are currently are developing a new website for the Bio-Plastic Container Cropping Systems project. <http://140.254.84.203:90/> or hvp.osu.edu/bioplastics. The site will be operational by early 2014. Annual reports, articles and conference presentations will be available on the site. The site will also serve as a place for the researchers on the project to communicate new findings.

iii) YouTube and Facebook:

2011 initiated Greening the Highways Facebook. Multiple entries.
<http://www.facebook.com/pages/Greening-the-Highways/117123348380397>

2011 You Tube. Greening the Highways.
<http://www.youtube.com/watch?v=4uxaTvp6l34>

2011. Greening Ontario's Highways. OMAFRA Growing Forward – Farm Innovation Program
<http://www.youtube.com/watch?v=nMyXRb8QTzY>

III. **Radio and television**

June 30, 2011. Channel NBC4. Ben Gelber, Meteorologist. WCMH-TV 4. Urban trees.
<http://video.nbc4i.com/v/42239346/urban-trees.htm?q=trees>

January 20, 2007. Channel 4. Tom McNutt. OSU Nursery Short Course Jim Gardiner - Special Sunday Evening Program. 0.25 hrs.

January 21, 2006. Channel 4. Tom McNutt. OSU Nursery Short Course Alan Armitage Special Sunday Evening Program. 0.25 hrs.

Susan Morgan - HGTV Newsletter – article on web. Nov. 2005

IV. **Other creative works**

i) Trade publications

My articles have been read in these 12 trade magazines and newsletters (summarized in *Research – Quality* indicators), and reprinted in numerous circulars, newsletters and other trade magazines. I get numerous calls and email messages regarding my articles and have found them to be an extremely effective means of establishing a national and international reputation. Total numbers of individuals reached via these 10 magazines in the past 10 years is 87,159. In Ohio, I have established a nationally and internationally recognized extension program through writing of my monthly column in the Ohio Nursery and Landscape Association magazine, *Buckeye*. My writing has in part resulted in my invitations to speak in 27 states outside Ohio, six Canadian provinces and three countries since 2005. Since 2005-present I have written 76 trade magazine articles 46 regular column and 30 requested by editor; however, since 1988 I have written 208 trade articles: 154 regular contributed and 52 as editor requested.

➤ Invited articles:

1. Mathers, H. M. 2013. Improving Your Landscape Nursery Weed Control. The Michigan Landscape

56(1):40-45.

2. Mathers, H.M. 2013. Containing Weeds. *American Nurseryman*. 212(4): 18-22, 24-25.
3. Mathers, Hannah. 2012. Top 10 Most Unwanted Landscape Weeds. Part III. *The Michigan Landscape* 55(6):40-43.
4. Mathers, Hannah. 2012. Top 10 Most Unwanted Landscape Weeds. Part II. *The Michigan Landscape* 55(5):41-44.
5. Mathers, Hannah. 2012. Top 10 Most Unwanted Landscape Weeds. Part I. *The Michigan Landscape* 55(4):40-43.
6. Mathers, Hannah. 2012. Mode-of-Action Herbicides: Why You Should Know. *The Michigan Landscape* 55(3): 36-39.
7. Mathers, H. M., Case, L.T. and Parrish, J. 2011. Nursery research update: Comparison of fertilizers: Using advanced granular technology. *Landscape Trades* 33(1): 26, 28, 30.
65% Authorship: I wrote the grant, conducted the design, led data collection and analysis.
8. Mathers, H. 2011. Green vs. greener: Alternative ornamental weed control. *Groundwork*. A Publication of the Landscape Contractors Association, MD, DC, VA. May 2011:7-8, 10-13.
9. Mathers, H. 2011. Dr. Hannah Mathers discusses glyphosate resistance. *Ohio Nursery and Landscape Association Facebook*.
<http://www.onla.org/index.cfm/fuseaction/articles.detail/articleID/10/index.htm>
10. Rosenberger, D., Miranda Sazo, M., Mathers, H., Watkins, C. 2010. Potential non-target effects of glyphosate on apples. *Scaffold Fruit Journal*. 19(20):4-9.
20% Authorship: Original concept and previous supporting data.
11. Mathers, H.M., Case, L., Zondag, R., Daniel, K. 2010. A new look at fertilizer guidelines. *Nursery Management & Production*. 26(6): 26, 29-30, 32.
65% Authorship: I wrote the grant, conducted the design, led data collection and analysis.
12. Mathers, H.M. 2010. Alternative ornamental weed control. *MGIA Landsculptor*. March: 30-34.
13. Mathers, H. M. 2009. Let them see their mothers. *Landscape Trades* 31(9):34-35.
14. Mathers, H.M. 2009. Diagnosing bark cracking problems: A horror and a mystery! *Landscape Trades* 31(4):34-35.
15. Mathers, H. M. 2008. A new face at Vineland. *Landscape Trades* 30(9):50-51.
16. Mathers, H.M. 2008. Take care when using glyphosate around trees. *Nursery Management & Production*. 24(7): 43-44, 46, 48.
17. Mathers, H. M. 2008. Bark Cracking. *The Michigan Landscape*. Michigan Nursery and Landscape Association.
18. Mathers, H. M. 2008. Take care when using glyphosate around trees. *Nursery Management & Production*. 24(7): 43-44, 46, 48-49.
19. Scagel, C. and H. Mathers. 2008. Root death in the landscape. *American Nurserymen* 207(2): 26-28,

30, 33-34. (45% contribution).

35% Authorship: Assisted with writing and literature review.

20. Mathers, H. M., Case, L. T., and Rivera, D. 2007. An ace up your sleeve. *American Nurserymen* 206(11): 36-38, 40, 42-44, 46.
65% Authorship: I wrote the grant, conducted the design, led data collection and analysis.
 21. Mathers, H. M. 2007. Recognize herbicide injury. *Nursery Management & Production*. 23(4):50-52, 54, 56, 60.
 22. Mathers, H.M. 2006. Finding solutions for root circling. *American Nurseryman*. 204(10): 8-9.
 23. Mathers, H.M. 2006. Liner production. *American Nurseryman*. 204(11):26-28, 30-31.
 24. Mathers, H.M. 2006. Bark cracking. *Nursery Management & Production*.
 25. Mathers, H.M. 2006. Plant health strategy to greenhouse weeds control. *OFA Bulletin*. Number 899: 23-27.
 26. Mathers, H.M. 2006. Nothing is easy anymore. *The Michigan Landscape*. Michigan Nursery and Landscape Association. 49(3): 45-47.
 27. Mathers, H.M. and R. Zondag. 2006. New and difficult weeds in Midwest Nurseries: Red Stem Filaree (*Erodium cicutarium*). *The Michigan Landscape*. Michigan Nursery and Landscape Association. 49(2): 49.
85% Authorship: I wrote the paper; Randy contributed pictures.
 28. Mathers, H.M. and R. Zondag. 2006. New and difficult weeds in Midwest Nurseries: Creeping Yellow Field Cress (*Rorippa sylvestris*). *The Michigan Landscape*. Michigan Nursery and Landscape Association. 49(1): 46.
85% Authorship: I wrote the paper; Randy contributed pictures.
 29. Mathers, H.M. 2005. Overwintering ornamental plant material: The cold facts. *Indiana Nursery and Landscape News* 65(5): 30-33.
 30. Mathers, H.M. 2005. Greenhouse weeds control. *American Nurseryman* 202(7): 24-26, 28-29.
- Contributed Articles (Regular column):
1. Mathers, H.M. 2012. The 10 most unwanted landscape weeds: Part 2. *Buckeye* 23(8):18-25.
 2. Mathers, H.M. 2012. The 10 most unwanted landscape weeds: Part 1. *Buckeye* 23(7):14-18, 42.
 3. Mathers, H.M., L.T. Case and R. Zondag. 2012. Fertilizing nursery and landscape trees: not a "One size fits all process: Part 2." *Buckeye* 23(6):17-23.
65% Authorship: I wrote the grant, conducted the design, led data collection and analysis.
 4. Mathers, H.M., L.T. Case and R. Zondag. 2012. Fertilizing nursery and landscape trees: Not a "one-size fits all" process: Part 1." *Buckeye* 23(4):11-13
65% Authorship: I wrote the grant, conducted the design, led data collection and analysis.
 5. Mathers, Hannah. 2012. Mode-of-Action Herbicides: Why You Should Know. *Buckeye* 23(2):23-25.

6. Mathers, Hannah. 2012. When uncommon becomes more common: Circumstances and requirements leading to nutrient deficiencies in woody plants. *Buckeye* 23(1):19-20, 22.
7. Mathers, H.M. 2011. Greening the Highways: Tree liner production in Ontario and Ohio. Part 1: The study. *Buckeye* 22(3):32-35.
8. Mathers, H.M. 2011. Greening the Highways: Tree liner production in Ontario and Ohio. Part 1: The results. *Buckeye* 22(4):28-33.
9. Mathers, H. M., Case, L. and Zondag, R. 2010. Container grown ornamentals: Experimental slow-release formulations. *Buckeye* 21(7):24-27.
65% Authorship: I wrote the grant, conducted the design, led data collection and analysis.
10. Mathers, H. M., Daniel, K. and Taylor, N. 2010. Current knowledge of causes and influences of bark cracking: Part 4. Position, sucker removal, caliper, tree guards. *Buckeye* 21(4):23-26.
30% Authorship: Lead writer and design conductor.
11. Mathers, H. M., Daniel, K. and Taylor, N. 2010. Current knowledge of causes and influences of bark cracking: Part 3. Wounding. *Buckeye* 21(3):25-27.
30% Authorship: Lead writer and design conductor.
12. Mathers, H. M., Daniel, K. and Taylor, N. 2010. Current knowledge of causes and influences of bark cracking: Part 2. Bark injuries. *Buckeye* 21(2):17-18.
30% Authorship: Lead writer and design conductor.
13. Mathers, H. M., Daniel, K. and Taylor, N. 2010. Current knowledge of causes and influences of bark cracking: Part 1. Bark type. *Buckeye* 21(1):15-17.
30% Authorship: Lead writer and design conductor.
14. Mathers, H. M. 2009. Root deformations and planting. *Buckeye* 20(4): 20-21.
15. Mathers, H. M. 2008. Recession-proof your company: Attend the 80th anniversary, 2009 OSU nursery short course. *Buckeye*. November: 24-27.
16. Mathers, H. M. 2008. Denial: Not just a river in Egypt. *Buckeye*. July: 29-32.
17. Mathers, H. M. 2008. Eluding the roundup tragedy. Part 2: Your trees on crack. *Buckeye*. May: 19-21.
18. Mathers, H. M. 2008. Eluding the roundup tragedy. Part 1: Your trees on crack. *Buckeye*. March: 19-21.
19. Mathers, H. M. 2008. Domino effect = All wet. *Buckeye*. February: 13-15.
20. Mathers, H. M. and A. Acuna. 2008. Ayuda tecnica – Technical training for Hispanic nursery employees. *Buckeye*. January: 18-20.
65% Authorship: I wrote the grant, conducted the design, led data collection and analysis.
21. Mathers, H. M. 2007. An ace up your sleeve, Part 1. *Buckeye*. December: 13-16.
22. Mathers, H. M. 2007. A program of "masters" at the 2008 OSU Nursery Short Course; Celebrate the ONLA's 100th! *Buckeye*. October: 29-32.
23. Mathers, H. M. 2007. Invasive plants and the nursery/landscape industry. Part 4. *Buckeye*. July: 21-

24.

24. Mathers, H. M. 2007. Invasive plants and the nursery/ landscape industry: Part 3. Buckeye. June: 24-25.
25. Mathers, H. M. 2007. Invasive plants and the nursery/landscape industry. Part. 2. Buckeye. May: 25-31.
26. Mathers, H. M. 2007. Site preparation: Doing the groundwork! The Buckeye. February: 12-15.
27. Mathers, H.M. 2007. December. Herbicide Injury. Part 2. The Buckeye. January. Pp. 12-16.
28. Mathers, H.M. 2006. Herbicide Injury. Part 1. The Buckeye. December. Pp.12-16.
29. Mathers, H.M. 2006. Program highlights of the 2007 OSU Nursery Short Course: Join us! The Buckeye. October. Pp. 14-16.
30. Mathers, H.M. 2006. Root circling. The Buckeye. September. Pp. 14-15, 18.
31. Mathers, H.M. 2006. The less commonly discussed plant problems. The Buckeye. August. Pp. 14, 16.
32. Mathers, H. M. 2006. Possible root problems. The Buckeye. June. Pp. 16-19.
33. Mathers, H.M. 2006. Field planting of caliper trees "The first year." The Buckeye. May. Pp. 14-18, 21.
34. Mathers, H.M. 2006. Bark Cracking: Part 2. A horror and a mystery! The Buckeye. April. 2006. Pp. 24-26.
35. Mathers, H.M. 2006. Bark Cracking. Part 1: Nothing is easy anymore. The Buckeye. January. 2006. Pp. 17-18, 20-21.
36. Mathers, H.M. 2005. Factors altering root growth in nursery containers. Part 4: Compost and Plant Characteristics. The Buckeye. December. 2005. Pp. 14-16.
37. Mathers, H.M. 2005. Factors altering root growth in nursery containers. Part 3: Container characteristics. The Buckeye. November. 2005. Pp. 14-16.
38. Mathers, H.M. 2005. Factors altering root growth in nursery containers. Part 2: Media decomposition and chemical properties. The Buckeye. October. 2005. Pp. 14-17.
39. Mathers, H. M. and L.T. Case. 2005. Factors altering root growth in nursery containers. Part 1: Media physical properties. The Buckeye. September. Pp. 15-18.
90% Authorship: I wrote the paper and led data collection as well as data analysis.
40. Mathers, H. M. and L.T. Case. 2005. Field evaluation of various herbicide and mulch combinations for ornamental weed control. The Buckeye. July. Pp. 18-19.
90% Authorship: I wrote the paper and led data collection as well as data analysis.
41. Mathers, H.M. 2005. The Power of Ayuda Technica: Technical Training Opportunities for Hispanic Employees. The Buckeye. June. Pp.14, 17.
42. Mathers, H. M. and L.T. Case. 2005. The latest research in ornamental weed control: Part III. Field evaluation of various herbicide and mulch combinations for ornamental weed control. The Buckeye.

May. Pp. 14, 18, 20.

85% Authorship: I wrote the grant and led data collection as well as data analysis.

43. Mathers, H. M. and L.T. Case. 2005. The latest research in ornamental weed control: Part II. New formulations. The Buckeye. April. Pp. 14, 18.

85% Authorship: I wrote the grant and led data collection as well as data analysis.

44. Mathers, H.M. 2005. The Latest Research in ornamental weed control: Part I, Current issues and new herbicides. The Buckeye. March. Pp.15-18.

45. Mathers, H.M. 2005. Problematic weeds in Ohio landscapes and nurseries: Part 5. Marestalk and Creeping Charlie. The Buckeye. February. Pp.15-18.

46. Mathers, H.M. 2005. Problematic weeds in Ohio landscapes and nurseries: Part 4. Field horsetail. The Buckeye. January. Pp.16, 18.

1) *Brief Description of the Focus of the Candidate's Research, Scholarly or Creative Work, Major Accomplishments, and Plans for the Future, including Works in Progress*

My goal is to fully integrate my applied research and extension programs so that where one begins and the other ends is imperceptible. To achieve this integration, four principles have been applied: 1) principles of sustainable horticulture; 2) restoration of woodlands in urban landscapes; 3) increasing the worth of the Ohio nursery industry through crop diversification, market expansion and increased labor efficiency; and 4) best management practices for ecological sound cultural practices. I have used three criteria for development of a research program including: developing relationships and determining industry priorities to acquire monetary support from industry and industry affiliates; produce unique scientific contributions that have applied significance in the nursery and landscape industries; and, create research opportunities that attract resourceful, creative graduate students.

Focus #1: Development of herbicide and bio-herbicide treated bark - as slow release carriers for the herbicides for use in nursery and landscape operations. An invention disclosure was submitted in 2001, the development of herbicide treated bark resulted in two new products entering the market place, *WeedStop* and *PreenMulch* which have added value to mulch and reduced the costs associated with nursery and landscape weed control, particularly hand weeding. To further reduce the bio-rational impact of herbicide treated mulch, extracts of alleopathic plants and organic herbicides such as acetic acid and pelargonic acid have been trialed since 2008. One new invention disclosure has been submitted re two alleopathic plant extracts showing promise in OSU trials. The landscape industry in Ohio is worth over \$2 Billion (Bn) and is one of the state's major employers. Development of environmentally friendly landscape weed control practices is imperative to the economic stability of this industry. In addition to the two invention disclosure submitted, 39 out-of-state (in 16 states, 3 Canadian provinces, and one District of Columbia) and 21 in-state presentations have been conducted with 74% of these being invited. In addition, 37 out-of-state presentations in 10 states, 2 provinces and one district, with 85% invited regarding traditional weed control have developed from this research focus area. Numerous grants have been received for this research and information requests from national and international sources occur weekly. My goal is to develop a commercial product that can be sold as an OMRI registered product for landscape and nursery use.

Focus #2: Restore woodlands in urban landscapes, increase urban tree survival and expand crop diversification in Ohio nurseries.- With over 60 Million acres of right-of-way (ROW) land associated with US highways, the opportunities to decrease greenhouse gases and global warming via planting and increasing survival of trees along highways is immense. Lack of data regarding tree survival and means of promoting survival in highway ROW's have limited the conversion of highway ROW's from carbon sources to carbon sinks. Planting of tree liners grown in retractable roof greenhouses (RRG) at high densities has shown a 10% increase in tree survival versus conventional field production and is only

production method to provide 100% survival at any site trialed in Toronto, Canada on the busiest highway in North America (401/427) (2010) and three sites in Gahanna, OH (2011 and 2012). My goal is to develop a *Center of Excellence for Highway Greening* at OSU with grants gathered from state and national and international transportation commission and long-term self-sustaining funding from trading of carbon- and pollution- credits on the stock market. Eight out-of-state presentations (63% invited) in four states and two Canadian provinces have been conducted and 3 in-state (67% invited) have been developed. In addition, 22 out-of-state (50% invited) (9 states, 2 provinces and 2 other countries outside North America) (11 in-state, 27% invited) and 15 out-of-state (80% invited) (7 states and 3 provinces) (13 in-state, 69% invited) in tree liner production in RRGs and sustainable practices, respectively, have been developed from this research focus.

Focus #3: Understanding the role glyphosate in tree hardiness reduction, bark cracking and internal browning disorder in apples. With my combined expertise and training in cold hardiness of woody plants and weed science I determined a link between glyphosate misuse and bark splitting. An estimated \$5 Mn worth of landscape and nursery trees are lost annually due to cold injuries and bark splitting that is now linked to improper glyphosate use around the trunks of trees. OARDC (Daniel and Mathers, 2012), and Cornell University researchers have also shown a link between improper glyphosate use and the incidence and severity of internal browning in Empire Apples during cold storage. Research is on-going to further characterize glyphosate movement in thin-barked trees and duration of herbicide activity in the plant with Master's student project Laura Giese (2011-13). This research has resulted in several nurseries relying more on preemergence herbicides versus the postemergence glyphosate with an estimated \$1 Mn reduction in weed control costs. Some nurseries have completely discontinued the use of glyphosate resulting in the ability to produce saleable trees such as yellow magnolias and other marginally hardy species. Previously these trees were too severely cracked to sell. 30 out-of-state (14 states, 2 provinces) (80% invited) and 24 in-state (79% invited) presentations have been conducted from this focus area.

Focus #4: Discovery of an effective product for liverwort control in enclosed structures. Pre- and postemergence herbicides evaluations for control of non-vascular weeds (moss and liverwort) have been conducted in greenhouse and nursery enclosed structures for the past five years. *Marchantia polymorpha* L. (a thalloid liverwort) is a common plant pest for which billions have been spent to develop controls, without success. The presence of liverwort is considered unsightly, reduces plant quality and vigor and impacts the final valuation of the crop. In the Midwest, the annual loss to nurseries and greenhouses is over \$100,000 due to ineffective liverwort control. In coastal US states it is much higher. In 2012, we discovered a new product that shows the highest efficacy and reduced phytotoxicity of any product evaluated in the past five years. An invention disclosure has been submitted. Four out-of-state talks have been presented regarding liverwort control with 50% being invited, in three states and one province.

2) *Description of Quality Indicators of the Candidate's Research, Scholarly or Creative Work such as Citations, Publication Outlet Quality Indicators Such as Acceptance Rates, Ranking or Impact Factors of Journal or Publisher.*

My goal is to publish in journals that are highly cited within my field and derive from the professional societies I support. These are typically journals that have low impact factors in the scientific community but high impact with the industry such as *Acta Hort* and *JEH*. To be more visible to my peers at other universities, I have tried to increase my publication numbers in higher ranked journals (for my discipline) such as *HortScience* (4) and *Weed Technology/ Weed Science* (2). One of my articles in *HortTechnology - Abiotic Factors Influencing Root Growth of Woody Nursery Plants in Container*. H.M. Mathers, S.B. Lowe, C. Scagel, D.K. Struve, L.T. Case. 2007, was one of the 10 most read articles for four months in 2011 (June, July, August and September). My articles are often cited and I am often asked to review several manuscripts in my discipline annually.

Journal	# of Pubs.	Impact Factor	Acceptance	Scientific Journal Rank (SJR) *
[^] <i>HortTechnology</i>	5	0.702	52.5%	0.034
*Journal of Environmental Horticulture (JEH)	2	No impact factor	30%	Not ranked
[^] HortScience	4	0.794	52.5%	0.038
[^] Weed Technology	1	0.854	71%	0.047
Weed Science	1	1.631	34%	0.064
Acta Horticulture	1	None	50%	0.029

* http://www.scimagojr.com/journalrank.php?area=1100&category=1102&country=CA&year=2011&order=sjr&min=0&min_type=cd

[^] These are the highest impact journals for my field.

* JEH is the most cited ornamental research journal and also the journal preferred by the funding agency Horticulture Research Institute that is associated with the American Nursery and Landscape Association.

[^]WeedTechnology is rated 28/49 agriculture journals.

Trade Publication	Circulation
American Nurseryman (the only paid circulation magazine in the industry)	13,452
Greenhouse Product News	2,000
Indiana Nursery and Landscape News	2,000
Landscape Management	5,000
Michigan Nursery and Landscape Association. <i>The Michigan Landscape</i>	8,200
Nursery Management and Production	15,243
Ohio Nursery and Landscape Association <i>Buckeye</i>	6,000
Oregon Association of Nurserymen <i>Digger</i>	4,000
Oregon State University/Oregon Dept. of Agriculture Nursery News	6,000
Pennsylvania Landscape and Nursery Association Magazine	2,000
TurfGrass Trends	32,000
Virginia Nursery and Landscape Association Newsletter	800

a. Funded Research Proposals - Principal investigator:

1. Mathers, H. M. 2012. Ohio department of agriculture, Specialty Crop Block Grant Program-Farm Bill. Major Weed Control Issues in Ohio Nurseries and Christmas tree Plantations. \$50,000.00. 11/ 2012 to 12/2013. Funding Success Ratio: 10%.
2. Mathers, H. M. 2012. Michigan department of agriculture, Specialty Crop Block Grant Program-Farm Bill. Addressing foremost weed control issues for the Michigan nursery and landscape industries. \$54,000.00. 10/ 2012 to 12/2013. Funding Success Ratio: <1%.
3. Mathers, H. M. 2012. Efficacy of liverwort controls and phytotoxicity of selected new herbicides to containerized nursery stock in Ohio and MI: The IR-4 Program in 2012. USDA/ IR-4. \$25,000. End 07/31/13.
4. Mathers, H. M. 2011. Ohio department of agriculture, Specialty Crop Block Grant Program-Farm Bill. State-wide Weed Control Initiative for Ohio Nurseries. \$50,000.00. 11/ 2011 to 12/2012. Funding Success Ratio: 10%.
5. Mathers, H. M. 2011. Efficacy of liverwort controls and phytotoxicity of selected new herbicides to containerized nursery stock in Ohio and MI: The IR-4 Program in 2011. USDA/ IR-4. \$25,000.

End 07/31/12.

6. Mathers, H. M. 2011. Michigan department of agriculture, Specialty Crop Block Grant Program-Farm Bill. Addressing foremost weed control issues for the Michigan nursery and landscape industries. \$75,000.00. 10/ 2010 to 12/2011. Funding Success Ratio: <1%.
7. Mathers, H. M. 2011. Nursery/ landscape Senior Research Fellow. Vineland Research and Innovation Centre (VRIC) \$10,456. Funding Success Ratio: <1%.
8. Mathers, H. M. 2011. Anderson field fertilizer trail. OBIC. \$13,265. Funding Success Ratio: <1%.
9. Mathers, H.M. 2011. Greening the Highways: Increasing survival of out-planted trees in stressful environments – Year 2. Ontario Growing Forward. Farm innovation program (FIP) through Landscape Ontario. \$35,860 Funding success ratio: 10%
10. Mathers, H.M. 2010. "Greening the Highways" - Sustainable Tree Plantings Using Ohio and Ontario Grown Tree Liners. Ohio State University/ OARDC Seed Grant Competition. New Enterprise Competition with International Collaboration. New Submission. 04/01/2010 for 24 months. \$49,232.00.
11. Mathers, H. M. 2010. Anderson field fertilizer trail. OBIC. \$13,265. Funding Success Ratio: <1%.
12. Mathers, H. M. 2010. Anderson preemergence field trail. OBIC. \$15,985. Funding Success Ratio: <1%.
13. Mathers, H. M. 2010. Anderson container fertilizer trail. OBIC. \$10,825. Funding Success Ratio: <1%.
14. Mathers, H. M. 2010. Nursery/ landscape Senior Research Fellow. Vineland Research and Innovation Centre (VRIC) \$30,333. Funding Success Ratio: <1%.
15. Mathers, H. M. 2010. Michigan department of agriculture, Specialty Crop Block Grant Program-Farm Bill. Addressing foremost weed control issues for the Michigan nursery and landscape industries. \$75,000.00. 10/ 2010 to 12/2011. Funding Success Ratio: <1%.
16. Mathers, H. M. 2010. Efficacy of liverwort controls and phytotoxicity of selected new herbicides to containerized nursery stock in Ohio and MI: The IR-4 Program in 2010. USDA/ IR-4. \$24,500. End: 06/ 12.
17. Mathers, H. M. 2009-10. Phytotoxicity of selected new herbicides to containerized nursery stock in Ohio: The IR-4 Program in 2009-10. USDA/ IR-4. \$14,000.
18. Mathers, H. M. 2010. Greening the Highways: Increased out-plant survival in stressful environments. Ontario Growing Forward. Farm innovation program (FIP) through Landscape Ontario. \$37,760.
19. Mathers, H. M. 2009. Michigan department of agriculture, Specialty Crop Block Grant Program-Farm Bill. State-wide weed control initiative for Michigan Nursery and Landscape Industry. \$75,000.00. 03/ 2010 to 12/2010. Funding Success Ratio: <1%.
20. Mathers, H. M. 2009. Crop Diversification, Growth Acceleration and Increased Out Plant Survival of Ontario Grown Tree Liners. Ontario Research & Development Committee through Landscape

Ontario. \$ 60,620.26.

21. Mathers, H.M., 2009. *Greening the Highways -- Growth Acceleration and Increased Out Plant Survival of Ontario Grown Tree Liners*. Farm Innovation Program. \$46,000
22. Mathers, H. M. 2009. Nursery/ landscape Senior Research Fellow. Vineland Research and Innovation Centre (VRIC) \$46,688.00. Funding Success Ratio: <1%.
23. Mathers, H. M. 2008. Anderson field fertilizer trail. OBIC. \$23,677.50. Funding Success Ratio: <1%.
24. Mathers, H. M. 2008. Anderson preemergence field trail. OBIC. \$17,345.00. Funding Success Ratio: <1%.
25. Mathers, H. M. 2008. Anderson container fertilizer trail. OBIC. \$16,580.00. Funding Success Ratio: <1%.
26. Mathers, H. M. 2008. Cravo retractable roof greenhouse plus installation – 96ft. Ontario consumables and equipment grant. Vineland Research and Innovation Centre (VRIC) \$87,300.00. Funding Success Ratio: <1%.
27. Mathers, H. M. 2008. Nursery/ landscape research cluster - Chair position. Vineland Research and Innovation Centre (VRIC) \$43,968.00. Funding Success Ratio: <1%.
28. Mathers, H. M. 2007. Evaluation of the influence of postemergence herbicides and fertility in nursery tree bark cracking. Horticultural Research Institute (HRI). \$17,000. Funding Success Ratio: 14%.
29. Mathers, H. M. 2007. Phytotoxicity of selected new herbicides to containerized nursery stock: The IR-4 Program in 2007. USDA/ IR-4. \$7,500.
30. Mathers, H. 2006. Evaluation of the influence of postemergence herbicides, fertility and liner origin in nursery tree bark cracking. United States Department of Agriculture – Agriculture Research Station, Wooster, OH. \$10,000. Funding Success Ratio: High.
31. Mathers, H. 2006. Evaluation of the influence of postemergence herbicides, fertility and liner origin in nursery tree bark cracking. Ohio Nursery and Landscape Association. \$4,000. 2006-2008. Funding Success Ratio: High.
32. Mathers, H. 2006. The influence of DNA herbicides on root and shoot hardiness during nursery field overwintering. Horticultural Research Institute (HRI). \$14,000.00. Funding Success Ratio: 10%
33. Mathers, H. 2005. Cold hardiness comparison of containerized and bareroot tree liners out planted in the field. ONLA. \$10,000. 2005-2010 Funding Success Ratio: High.
34. Mathers, H. 2005. OARDC Equipment proposal. 32,000g balance and Campbell Scientific Datalogger. \$2354.00
35. Mathers, H. 2005. Root hardiness and influence of DNA herbicides in overwintered containers. United States Department of Agriculture – Agriculture Research Station, Wooster, OH. \$10,000. Funding Success Ratio: High.

b. Funded Research Proposals - Co-investigator

1. Graves, W. Grewell, D., Kratsch, H., Larock, R., Stewart, R., Mathers, H., Ward, R. 2011-2016. BioPlastic container cropping systems: Green technology for the green industry. USDA-NIFA/Specialty Crop Research Initiative. \$ 1,900,000.00 (\$239,410.00 – Dr. Mather's portion). 20% Success rate.

20% Authorship, wrote extension outreach activities and budget

2. Mathers, H.M, Brownbridge, M. and Zheng, Y. 2010. Evaluation of novel materials and additives in postharvest storage and transplant survival of bare-root nursery stock. Growing Canadian Agr. Innovations Program (GCAP) – AgScience cluster worksheet. \$72,000.

80% Authorship, lead author for grant, original concept

3. Mathers, H. M., Beckerman, J., Michelbart, M., Scagel, C., and Parrish, J. 2009. Your trees on crack - The role of glyphosate in nursery/ landscape bark cracking. \$20,000 Horticultural Research Institute (HRI). 2009-2010. Grant. Nature of Intellectual Contribution (95%) My research idea, wrote 95% of grant, 100% of literature review, materials and methods, etc. Funding Success Ratio: 17%.

80% Authorship, lead author for grant, original concept

4. Mathers, H. 2009. Farm Innovation Program. Greening the Highways -- Growth Acceleration and Increased Out Plant Survival of Ontario Grown Tree Liners. \$38,500.

5. Dale, A., A. Koziol, P. Giorgio, J. Brandle, B. Thurston, and H. Mathers. 2008. Hazelnuts and rapid tree propagation using Earthgen technology. Ontario Centers of Excellence. \$299,639.00.

5% Authorship, field trial portion at VRIC.

6. Mathers, H. M., Cardina, J and Scagel, C. 2008. Evaluation of the invasive and noxious weed species propagule-bank in Ohio nurseries, landscapes and natural areas. HRI. \$15,000. 2008-2009. Funding Success Ratio: 14%.

60% Authorship, lead author for grant, original concept

7. Mathers, H.M., J. Beckerman. 2007. Evaluation of the influence of postemergence herbicides and fertility in nursery tree bark cracking. Horticultural Research Institute (HRI). 2002. Funded at: \$17,000. Period of Funding: 05/2006 to 05/2009. Funding Success Ratio: 10%

90% Authorship, my research idea, wrote 95% of grant, 100% of literature review, materials and methods, etc.

C. Grant Proposals Submitted, but not Funded:

1. Mathers, 2013. Root dormancy. HRI. \$20,000.00
2. Mathers, H. M. 2012. Tailoring Field Nursery Fertilizers by Species. Horticultural Research Institute (HRI). \$20,000.00. <10%.
3. Mathers, H. 2011. Greening the Highways: Sustainable Tree Plantings using Local Grown Tree

- Liners. Tree Research and Education Endowment Fund – John Z. Duling grant. \$10,000. Funding success rate: 6%.
4. Fain, G., Owen, J., Altland, J., Gilliam, C., Mathers, H., Boyer, C. et al. 2011-2016. USDA-NIFA/Specialty Crop Research Initiative. \$261,169.87.
 5. Mathers, H. 2010. Greening the Highways – Sustainable Tree Planting Using Ohio Liners. Ohio Department of Transportation Partnered Research Exploration Program. \$80,000
 6. Mathers, H. 2010. Ohio Department of Agriculture. Early Adopters Grant. \$31,000.
 7. Hall, C. A. Hodges, H. Mathers, D. Warnock, B. Behe, J. Dennis, S. Barton, J. Haydu, S. Schuch and 16 other members of the S-1021 Hatch project. 2008. Investigation of sustainable production practices, economic contributions, consumer behavior and labor management in the U.S. environmental industry. USDA/ CSREES, Specialty Crop Research Initiative. For my portion: \$134,160.
 8. Mathers, H. M., D. Rivera, D. and D. Long. 2008. Nursery Worker Turnover and Language Proficiency. \$23,000 Horticultural Research Institute (HRI). 2009-2010. Grant. Nature of Intellectual Contribution (95%) My research idea, wrote 95% of grant, 100% of literature review, materials and methods, etc. Funding Success Ratio: 17%.
 9. Mathers, H. M., D. Rivera, C. Scagel, R. Lamb. 2008. Impact of Root Growth Manipulations on Tree Production Efficiency. \$15,000 Horticultural Research Institute (HRI). 2009-2010. Grant. Nature of Intellectual Contribution (95%) My research idea, wrote 95% of grant, 100% of literature review, materials and methods, etc. Funding Success Ratio: 17%.
 10. Mathers, H. M. 2007. Evaluation of the invasive and noxious weed species propagule- bank in Ohio nurseries, landscapes and natural areas. \$10,000. Ohio IPM program.
 11. Mathers, H., 2006. Evaluation of mulching depths and herbicide formulations with herbicide treated mulch. Horticultural Research Institute (HRI). \$12,000.
 12. Mathers, H.M. 2006. Purging spurge in ornamental containers: An integrated approach. Horticultural Research Institute (HRI). \$15,000.
 13. Mathers, H.M. and L.T. Case. 2006 Evaluation of Mulching Depths and Herbicide Formulations with Herbicide Treated Mulch. Horticultural Research Institute (HRI). \$12,000.
 14. Mathers, H., H. Zhu, E. Regnier, E. Ozkan. 2005. Innovative delivery system for ornamental weed control. Horticultural Research Institute (HRI). \$12,000.
 15. Batte, M., S. Ernst, J. Chatfield, J. Boggs, Mathers, H. 2005. Measuring the scope and economic management needs of Ohio's green industry. OARDC Competitive Matching Grant Program. \$25,098.
 16. Mathers, H., N. Basta, E. Dayton. 2005. Purging spurge in ornamental weed control: An integrated approach. Northwest Nursery Crop Research Center (NNCRC) for USDA – ARS Coop. \$60, 240.
 17. Mathers, H., H. Zhu, E. Regnier, E. Ozkan. 2005. Innovative delivery system for ornamental weed control. Horticultural Research Institute (HRI). \$12,000.
 18. Mathers, H. 2005. Accelerated Pot-In-Pot production using double cropped retractable roof

greenhouse grown tree liners. Horticultural Research Institute (HRI). \$15,000.

19. Mathers, H., E. Regnier, E. Ozkan. 2005. Innovative deliver system for ornamental weed control. North Central Integrated Pest Management. Horticultural Research Institute (HRI). \$12,000.

D. Funded Training Grants - Principal Investigator:

- a. Mathers, H., J. Chatfield, D. Long. 2005. The Power of Ayuda Technica: Transforming Ohio Nursery Employees through Technical Training. Breaking the Language Barrier: Delivering Technical Information to Hispanic Nursery Employees. *OSU Cares Seed Grant*. \$7500. Period of Funding: 06/2005 to 06/2006. Grant. Nature of Intellectual Contribution (95% contribution), my research idea, wrote 95% of grant, 95% of literature review, materials and methods, etc. Funding Success Ratio: 10%.

E. Training Grants Submitted and not Funded - Principal Investigator:

None

F. Other Funding Received for Academic Work:

No.	Specify Project Supported	Donor	Type of Gift	Gift Value	Year Funded
	Product Testing	Bayer	Monetary, unrestricted	\$8,000	2013
	Product Testing Trial	Valent U.S.A. Corp.	Monetary, unrestricted	\$1,000	2013
	Product Testing	Everris	Monetary, restricted	\$16,000	2013
	Product Testing Trial	OHP	Monetary, unrestricted	\$6,000	2013
	IR-4 Ornamental Herbicide Projects	IR-4 research with OSU (PI: Dr. Hannah Mathers)	Monetary	\$23,000	2013
	Contributions of plant material and 10 research trial sites in 2012.	Studebaker Nurseries, J. Frank Schmidt Nursery, Willoway Nurseries, SunLeaf Nurseries, NorthBranch Nursery, BFN Nurseries, Spring Meadow Nursery and Northland Farms.	In-kind gift	\$30,000	2013
	OSU Nursery Short Course	OSU Nursery Short Course	Monetary, unrestricted	\$30,000	2013
	Product Testing	Bayer	Monetary, unrestricted	\$8,000	2013
	Product Testing	Bayer	Monetary, unrestricted	\$4,000	2012
	Product Testing Trial	Valent U.S.A. Corp.	Monetary, unrestricted	\$3,000	2012
	OSU Nursery Short Course	OSU Nursery Short Course	Monetary, unrestricted	\$20,000	2012
	Contributions of plant material and 10 research trial sites in	Losely Nurseries, Klyn Nurseries, Studebaker Nurseries, J. Frank Schmidt	In-kind gift	\$30,000	2012

2012.	Nursery, Scarff Nurseries, Willoway Nurseries, SunLeaf Nurseries, NorthBranch Nursery, BFN Nurseries, Spring Meadow Nursery and Northland Farms.				
Product Testing Trial	Dow Agro Sciences	Monetary, unrestricted	\$9,000	2011	
Product Testing Trial	BASF	Monetary, unrestricted	\$3,500	2011	
Product Testing	Bayer	Monetary, unrestricted	\$4,000	2011	
Product Testing	Agrium Technologies, Plant Products, Farfard, ASB Greenworld and Gro-Bark	Monetary, unrestricted	\$5,000	2011	
Contributions of plant material for research trials in 2011.	Decker Nurseries, Losely Nurseries, Klyn Nurseries, NorthBranch Nursery, Studebaker Nurseries, Sunleaf, Scarff Nurseries, Willoway Nursery, A. Brown & Sons, BFN Nurseries, Spring Meadow Nursery, Northland Farms, Willowbrook, Connon AVK, J. Frank Schmidt Nursery, and Braun Nurseries	In-kind gift	\$30,000	2011	
Beginning Entrepreneurs in Agricultural Networks (BEAN), the Urban Agriculture Innovation District (UAID) and Ohio State University Extension in Cuyahoga County.	Gift money was for transport of trees we donated to line the community garden farm in Cleveland.	Monetary	\$3,000	2011	
OSU Nursery Short Course	OSU Nursery Short Course	Monetary, unrestricted	\$20,000	2011	
Product Testing	Agrium Technologies, Plant Products, Farfard, ASB Greenworld and Gro-Bark	In-kind gift	\$10,000	2011	
Product Testing Trial	Dow Agro Sciences	Monetary, unrestricted	\$9,000	2010	
Product Testing Trial	BASF	Monetary, unrestricted	\$4,000	2010	
Product Testing	GeoHumus	Monetary, unrestricted	\$4,000	2010	
Product Testing	Valent USA	Monetary, unrestricted	\$3,000	2010	
Product Testing	Agrium Technologies, Plant Products and Gro-Bark	Monetary, unrestricted	\$7,000	2010	

Contributions of plant material for research trials in 2010.	Decker Nurseries, Losely Nurseries, Klyn Nurseries, Stuebaker Nurseries, A. Brown & Sons, Zelenka Nurseries, Spring meadow Nursery, Willowbrook, Connon AVK, Sunleaf, J. Frank Schmidt Nursery, and Braun Nurseries	In-kind gift	\$20,000	2010
OSU Nursery Short Course	OSU Nursery Short Course	Monetary, unrestricted	\$20,000	2010
Product Testing Trial	The Andersons, GeoHumus, Valent USA, Dow Agro Sciences, BASF	Monetary, unrestricted	\$17,500	2009
OSU Nursery Short Course	OSU Nursery Short Course	Monetary, unrestricted	\$20,000	2009
IR-4 Ornamental Herbicide Projects	IR-4 research with OSU (PI: Dr. Hannah Mathers)	Monetary	\$15,000	2009
Contributions of plant material and 11 research trial sites in 2009.	Decker Nurseries, Losely Nurseries, Klyn Nurseries, North American Plants, Mori Nursery, Stuebaker Nurseries, A. Brown & Sons, Lawyer, Kraemer's, Braun, Willowbrook, Connon AVK, Sheridan, Sunleaf, Bakker Nursery and J. Frank Schmidt Nursery	In-kind gift	\$35,000	2009
Product Testing Trial	The Scotts Co, Monsanto, The Andersons, GeoHumus USA, Valent USA, BASF	Monetary, unrestricted	\$32,500	2008
Contributions of pine nugget and hardwood bark mulch for various trails.	Buckeye Resources	In-kind gift	\$11,000	2008
Contributions of plant material for four research trials in 2008.	Decker Nurseries, Losely Nurseries, Klyn Nurseries, Smith Gardens, Heritage Seedlings, North American Plants, Stuebaker Nurseries, Gilson Gardens, Lake County Nursery, Poruban Nurseries, A. Brown & Sons, Willoway and J. Frank Schmidt Nursery	In-kind gift	\$11,140	2008
Product Testing Trial-VRIC	GeoHumus	Monetary, unrestricted	7,500	2008
IR-4 Ornamental Herbicide Projects	IR-4 subcontract 61-4134L with Purdue University, unable to conduct the	Monetary	7,500	2008

		research = 61-4134B with OSU (PI: Dr. Hannah Mathers)			
	Contributions of chemicals for IR-4 trials and other product testing in 2008.	The Scotts Co, Monsanto, The Andersons, GeoHumus USA, Valent USA, BASF, Nufarm Americas, Inc.	In-kind gift	\$7,000	2008
	Donations of pot-in-pot environments, nursery environments for invasive trial, plant material and environments for herbicide trials and fertilizer trials	Willoway Nurseries, Inc., Natorp's Nursery, Klyn Nurseries, Sunleaf, Bakker Nursery, Losely's, Mori Nurseries, Willowbrook Nursery	In-kind gift	\$ 16,000	2008
	IR-4 Ornamental Herbicide Projects (28).	IR-4/ USDA	Monetary	\$12,000	2008
	Contributions of pine nugget and hardwood bark mulch for various trails.	Buckeye Resources	In-kind gift	\$10,000	2007
	Contributions of plant material for four research trials in 2007.	Decker Nurseries, Losely Nurseries, Klyn Nurseries, Smith Gardens, Microplant, Heritage Seedlings, Studebaker Nurseries, Lake County Nursery and J. Frank Schmidt Nursery	In-kind gift	\$16,500	2007
	Effect of herbicides and grass/groundcover on cold hardiness of field grown nursery stock	Ohio Nursery Growers		\$3,000	2007
	Accelerated tree liner production using retractable roof greenhouses	Ohio Nursery Growers	In-kind gift	\$4,000	2007
	Pot-in-pot tree liner growth from three production environments	Willoway Nurseries, Inc	In-kind gift	\$ 4,000	2007
	Ohio State University Nursery Short Course program – for role as co-chair	Ohio State University Nursery Short Course committee	Monetary	\$20,000	2007
	Ohio Nursery and Landscape Association Graduate Student	Ohio Nursery and Landscape Association	Monetary	\$10,000	2007

	Stipend – Alejandra Acuna				
	Sponsored research with herbicide and mulch combinations	Mulch Manufacturing, Inc. , Reynoldsburg, OH	Monetary	\$17,000	2007
	Product Testing Trial	Dow AgroSciences, Syngenta, The Scotts Co, Crop Inspection Service, Valley Center, CA, Mulch Manufacturing	Monetary, unrestricted	\$30,500	2007
	Contributions of chemicals for IR-4 trials in 2007.	Dow AgroSciences, UPI, Valent, Syngenta	In-kind gift	\$8,000	2007
	Contributions of plant material for four research trials in 2006.	Decker Nurseries, Losely Nurseries, Klyn Nurseries, Smith Gardens, Microplant and J. Frank Schmidt Nursery	In-kind gift	\$8,500	2006
	IR-4 Ornamental Herbicide Projects (28).	IR-4/ USDA		\$15,000	2006
	Contributions of pine nugget and hardwood bark mulch for various trails and flower trail beds.	Buckeye Resources	In-kind gift	\$6,000	2006
	Contributions of plant material for IR-4 trials in 2006.	Smith Gardens and Losely Nurseries, Klyn Nurseries and J. Frank Schmidt.	In-kind gift	\$5,000	2006
	Bark Cracking in Nursery Trees	Ohio Nursery and Landscape Association	Monetary	\$4,000	2006
	Contributions of chemicals for research and IR-4 trials in 2006.	Dow AgroSciences, Valent USA, Syngenta,	In-kind gift	\$8,000	2006
	Field Herbicide Treated Mulches	Valent USA	Monetary, unrestricted	\$3,000	2006
	IR-4 Ornamental Herbicide Projects (23).	IR-4/ USDA		\$15,000	2006
	Product Testing Trial	Dow AgroSciences	Monetary, unrestricted	\$5,000	2006
	Ohio Nursery and Landscape Association Graduate Student Stipend – Alejandra Acuna	Ohio Nursery and Landscape Association	Monetary	\$10,000	2006
	Contributions of chemicals for research and IR-4 trials in 2005.	Dow AgroSciences, Valent USA,	In-kind gift	\$8,000	2005
	Ohio Nursery and	Ohio Nursery and	Monetary	\$10,000	2005

	Landscape Association Graduate Student Stipend – Elizabeth Grosskurth	Landscape Association			
	Field Evaluation of Ornamental Weed Control with Herbicide Treated Bark Mulches	Monsanto	Monetary, unrestricted	\$2,000	2005
	Herbicide Treated Mulches	Valent USA	Monetary, unrestricted	\$3,000	2005
	Product Testing Trial	Dow AgroSciences	Monetary, unrestricted	\$2,000	2005
	Contributions of plant material for four research trials in 2005.	Warner Kingwood Nursery and Klyn Nurseries, Losely Nursery and Microplant	In-kind gift	\$7,500	2005
	IR-4 Ornamental Herbicide Projects (26).	IR-4/ USDA		\$24,000	2005
	Grand Total			\$659,640	

6. List of Prizes and Awards for Research

- **Green Profile.** June 2003. The Pennsylvania Landscape & Nursery Association. Individuals who have made a significant impact nationally on the nursery/ landscape industry and had a noteworthy career in green industry are selected for the Green Profile. The Green Profile was published in the Pennsylvania Landscape & Nursery magazine 49(5):18-23. The profile details the individual's background and contributions to the industry through applied research in the past, along with future expected contributions and goals.

Service

1. List Editorships of or Service as an Editorial Reviewer or Board Member for Journals, University Presses or Other Learned Publications

i) Editor- and associate editorships

- Associate Editor for Journal of Environmental Horticulture (2005-present).
- Section Editor for Weed Section of the Southern Nursery Association Research Conference Proceedings (2014-2016)

ii) Service as External Reviewer for Journals

(1) HortScience – 2011

(2) HortScience -2008

(2) HortTechnology -2008

(1) Journal of the American Society for Horticultural Science-2007

(3) HortScience -2007

- (1) Proceedings of the Florida State Horticultural Society – 2006
- (1) Canadian Journal of Plant Science –2006
- (4) Weed Technology -2006
- (5) HortTechnology -2006
- (2) Journal of the American Society for Horticultural Science-2006
- (6) HortScience -2006

- (7) Weed Technology – 2005
- (8) Journal of the American Society for Horticultural Science – 2005
- (1) New Zealand Journal of Crop and Horticultural Science - 2005

iii) Grant and manuscript reviews and other not included above

Appointment, Promotion and Tenure Packet Review for University of Maryland Extension for tenure and promotion. Review CV and written appraisal same packet as 2010. August 2011.

Appointment, Promotion and Tenure Packet Review for University of Maryland Extension for tenure and promotion. Review CV and written appraisal. August 2010.

USDA- National Institute of Food and Agriculture (NIFA)/ Specialty Crop Research Initiative (SCRI) panel. 54 applications – 2.5 days of panel review plus orientation. April 5-8, 2010.

USDA/ ARS Review of 5-year Research Proposal. 2008

OSU Cares Seed and faculty Support Grants Review Team. 20 applications - 4 hour meeting for review. 2007

Program Venture Fund - Proposal review committee. Review 7 proposals and rank - for \$25,000 in funding 2007

Proposal Reviewer for 2005 Louisiana's NSF EPSCoR Pilot Funding for New Research (RFP 2004-21).

Proposal Reviewer for 2005 National Outreach Scholarship Conference: Transformation through Engagement

Offices Held and Other Service to Professional Societies

i) Professional committees chaired

Chair, American Society for Horticultural Science, Nursery Working Group, 2012.

Secretary, American Society for Horticultural Science, Stress Working Group, 2011-present.

Chair Elect, American Society for Horticultural Science, Nursery Working Group, 2010-11.

Weed Science Society of America, Ornamental Section, 2006.

Secretary of the American Society for Horticultural Science, Nursery Working Group, 2010-12.

Chair, Weed Science Society of America, Ornamental Section, 2007-08.

Chair Elect, Weed Science Society of America, Ornamental Section, 2006.

ii) Professional committees' member:

International Plant Propagators. Research Committee. 2008-present.

ASHS Extension Publication Award Committee. 2007-2010.

Ohio State University Extension Representative for Spanish Population Regional Working Group, 2006-2014

Ohio State University Representative for WCC-58 (Western Coordinating Committee 58 – Production, Transition Handling, and Reestablishment of Perennial Nursery Stock) Committee, 2001-2014

Ohio State University Representative for S-1051 formerly S290 and S-1021 (Technical and Environmental Efficiencies of Producing, Marketing and Managing Landscape Plants) Committee, 2001 - 2014.

Other Professional/Public Service

Committee Member. Scenic Ohio. October, 2010 – 2012.

University of Guelph, Plant Agriculture Department, Guelph, Ontario, Canada, Adjunct Professor Status. 2008- Present.

Vineland Research Innovation Center, Vineland, Ontario, Canada. Appointed Senior Research Fellow. June 2008- present.

Chair of Ohio Nursery and Landscape Association Short Course. 2012 -present

Co-Chair of Ohio Nursery and Landscape Association Short Course Committee, 2005 – 2011.

Board Member of Ohio Nursery and Landscape Association (non-voting), 2005 – 2010 and 2011-2014.

Ph.D. Graduate Student Presentation and Paper Judge for the Southern Nurserymen's Association Research Conference (August, 2005)

Member of Ohio Nursery and Landscape Association Greenhouse/ Nursery Committee, 2006- present

Member of Ohio Nursery and Landscape Association Education Committee, 2006- 2007.

Member of Ohio Nursery and Landscape Association Research Committee, 2004- present

Member of Ohio Nursery and Landscape Association Hispanic Relations Committee, 2001- 2007.

Member of Ohio Nursery and Landscape Association Program Short Course Committee, 2001 -2014

3) Administrative Service

a. Unit Committees:

H&CS committees chaired:

Chair Ohio State University/ Horticulture and Crop Science Department Extension Program Committee (2005-2007)

Ohio State University/ Horticulture and Crop Science Department 1st Graduate Research Retreat – Environmental Horticulture Section Moderator – (October, 2006)

CSRESS Review – Environmental Horticulture Section Moderator – (2005)

H&CS committees' member:

Member Ohio State University/ Horticulture and Crop Science Department Extension Program Committee (2010-2012) (2012-2014)

Member Ohio State University/ Horticulture and Crop Science Department Extension Program Committee (2001-2004)

Member of Ohio State University/ Horticulture and Crop Science Department Award Committee (01/2008-12/2010)

Member of Ohio State University/ Horticulture and Crop Science Department Graduate Studies Committee (01/2007-12/2008)

Member of Ohio State University/ Horticulture and Crop Science Department Greenhouse, Growth Chamber and Nursery Committee (01/2000-12/2006)

b. College or university committee

OSU Extension Legislative Luncheon. April, 2008. Learning more about migrant labor. Program highlighted *in* Extension Empowerment through Education. Booth – 2 hours. April, 2008

OSU Cares Seed and faculty Support Grants Review Team. 20 applications - 4 hour meeting for review. 2007

Program Venture Fund - Proposal review committee. Review 7 proposals and rank - for \$25,000 in funding 2007

Member of Ohio State University, Health Literacy Committee – Spanish Outreach. (February & March 2006)

Member of Ohio State University, The Department of Human and Community Resource Development Assistant/ Associate Professor Gist Chair Faculty Support Search Committee (April – October, 2006)

Nucleus Group, President Holbrook hosted University wide – “Building Human and Social Capital for the Knowledge Economy” – Employment Success and Entrepreneurship. (May 2006)

Member of Extension Specialist, Department of Consumer Sciences, Dr. Caezilia Loibl, Mentoring Committee (2005 – present)

Member of Extension Directors Advisory Committee (2005-2006)

Graduate faculty rep. on doctoral final oral examination in Natural Resources (March 2005)

Member of Ohio State University Extension Education Materials Policy and Procedures Sub-Committee (2003-06)

c. Initiatives undertaken to enhance diversity in your unit, college or the university

- **Bill Williams Diversity Award.** May 2007. The Ohio State University, College of Food Agriculture and Environmental Sciences. Outstanding efforts and accomplishments to diversity and inclusion.

7. Awards for Service

- **Award of Merit.** The Ohio Nursery and Landscape Association. For giving unselfishly of time, talent and resources to serve the association and, thus, the Green Industry in Ohio. January, 2008. Annual Convention.
- Meritorious Service Award. 2013. North Central District IR-4. US Department of Agriculture. Inter-regional 4 minor use program. For service supporting and advancing minor use registrations and the IR-4 program. July, 2013.

TEACHING

- i) Undergraduate and graduate student classes taught.

Period Offered	Course Number and Title (Credit Hours)	Enr	% Taught, Role	Stdnt. Eval.	Peer Eval.	Other Eval.	Instr. Method
Spring 2014	HCS 3488 - Professional Development (OSU Nursery Short Course and CENTS) (1)	5	100%	No	No	No	Other
Spring 2014	8999 Graduate Research, Horticulture and Crop Science (5)	1	100%	No	No	No	Other
Spring 2014	8999 Graduate Research, Horticulture and Crop Science (1)	1	100%	No	No	No	Other
Autumn 2013	HCS 3401.02 - Environmental Horticulture Organization in Ohio (1)	6	100%	No	No	No	Other
Autumn 2013	HCS 7806 - Methods in Plant Sciences (2)	1	100%	No	No	No	Didactic
Autumn 2013	8999 Graduate Research, Horticulture and Crop Science (5)	1	100%	No	No	No	Other
Autumn 2013	8999 Graduate Research, Horticulture and Crop Science (3)	1	100%	No	No	No	Other
Summer 2013	8999 Graduate Research, Horticulture and Crop Science (5)	1	100%	No	No	No	Other
Summer 2013	8999 Graduate Research, Horticulture and Crop Science (1)	1	100%	No	No	No	Other
Summer 2013	HCS 7193 - Individual Studies – Class for Plan B Masters student (2)	1	100%	No	No	No	Didactic

Spring 2013	HCS 3488 - Professional Development (OSU Nursery Short Course and CENTS)(1)	5	100%	No	No	No	Didactic
Spring 2013	HCS 4410 - Sustainable Landscape Maintenance (first time offered) (3)	9	100%	Yes	Yes	No	Didactic
Spring 2013	8999 Graduate Research, Horticulture and Crop Science (12)	1	100%	No	No	No	Other
Spring 2013	8999 Graduate Research, Horticulture and Crop Science (12)	1	100%	No	No	No	Other
Spring 2013	8999 Graduate Research, Horticulture and Crop Science (3)	1	100%	No	No	No	Other
Spring 2013	8999 Graduate Research, Horticulture and Crop Science (5)	1	100%	No	No	No	Other
Fall 2012	5533 Management of Commercial Nursery Operations (1 st offering in semester system) (3)	5	90%	Yes	No	No	Didactic
Fall 2012	8999 Graduate Research, Horticulture and Crop Science (12)	1	100%	No	No	No	Other
Fall 2012	8999 Graduate Research, Horticulture and Crop Science (2)	1	100%	No	No	No	Other
Fall 2012	8999 Graduate Research, Horticulture and Crop Science (12)	1	100%	No	No	No	Other
Fall 2012	8999 Graduate Research, Horticulture and Crop Science (10)	1	100%	No	No	No	Other
Summer 2012	999 Graduate Research, Horticulture and Crop Science (8)	1	100%	No	No	No	Other
Summer 2012	999 Graduate Research, Horticulture and Crop Science (8)	1	100%	No	No	No	Other
Summer 2012	999 Graduate Research, Horticulture and Crop Science (8)	1	100%	No	No	No	Other
Spring 2012	999 Graduate Research, Horticulture and Crop Science (15)	1	100%	No	No	No	Other
Spring 2012	999 Graduate Research, Horticulture and Crop Science (3)	1	100%	No	No	No	Other
Spring 2012	999 Graduate Research, Horticulture and Crop Science (10)	1	100%	No	No	No	Other

Spring 2012	999 Graduate Research, Horticulture and Crop Science (18)	1	100%	No	No	No	Other
Winter 2012	HCS 806 Methods in Plant Science (2)	5	100%	Yes	No	No	Didactic
Winter 2012	HCS 488 Professional Development (1)	6	100%	No	No	No	Didactic
Winter 2012	999 Graduate Research, Horticulture and Crop Science (10)	1	100%	No	No	No	Other
Winter 2012	999 Graduate Research, Horticulture and Crop Science (3)	1	100%	No	No	No	Other
Winter 2012	999 Graduate Research, Horticulture and Crop Science (10)	1	100%	No	No	No	Other
Winter 2012	999 Graduate Research, Horticulture and Crop Science (15)	1	100%	No	No	No	Other
Fall 2011	HCS 401.02 Environmental Horticulture Organization in Ohio (1)	14	100%	No	No	No	Other
Fall 2011	HCS 806 Methods in Plant Science (2)	2	100%	No	No	No	Didactic
Fall 2011	999 Graduate Research, Horticulture and Crop Science (14)	1	100%	No	No	No	Other
Fall 2011	999 Graduate Research, Horticulture and Crop Science (8)	1	100%	No	No	No	Other
Fall 2011	999 Graduate Research, Horticulture and Crop Science (11)	1	100%	No	No	No	Other
Fall 2011	999 Graduate Research, Horticulture and Crop Science (15)	1	100%	No	No	No	Other
Summer 2011	999 Graduate Research, Horticulture and Crop Science (18)	1	100%	No	No	No	Other
Summer 2011	999 Graduate Research, Horticulture and Crop Science (18)	1	100%	No	No	No	Other
Summer 2011	999 Graduate Research, Horticulture and Crop Science (18)	1	100%	No	No	No	Other
Spring 2011	999 Graduate Research, Horticulture and Crop Science (15)	1	100%	No	No	No	Other
Spring 2011	999 Graduate Research, Horticulture and Crop Science (7)	1	100%	No	No	No	Other
Winter 2011	HCS 488 Professional Development (1)	16	100%	No	No	No	Didactic

Winter 2011	999 Graduate Research, Horticulture and Crop Science (11)	1	100%	No	No	No	Other
Winter 2011	999 Graduate Research, Horticulture and Crop Science (11)	1	100%	No	No	No	Other
Fall 2010	HCS 401.02 Environmental Horticulture Organization in Ohio (1)	19	100%	No	No	No	Other
Fall 2010	HCS 806 Methods in Plant Science (2)	2	100%	No	No	No	Other
Fall 2010	999 Graduate Research, Horticulture and Crop Science (13)	1	100%	No	No	No	Other
Fall 2010	999 Graduate Research, Horticulture and Crop Science (7)	1	100%	No	No	No	Other
Fall 2010	999 Graduate Research, Horticulture and Crop Science (3)	1	100%	No	No	No	Other
Fall 2010	999 Graduate Research, Horticulture and Crop Science (2)	1	100%	No	No	No	Other
Summer 2010	999 Graduate Research, Horticulture and Crop Science (18)	1	100%	No	No	No	Other
Summer 2010	999 Graduate Research, Horticulture and Crop Science (3)	1	100%	No	No	No	Other
Summer 2010	999 Graduate Research, Horticulture and Crop Science (3)	1	100%	No	No	No	Other
Spring 2010	999 Graduate Research, Horticulture and Crop Science (18)	1	100%	No	No	No	Other
Spring 2010	999 Graduate Research, Horticulture and Crop Science (10)	1	100%	No	No	No	Other
Spring 2010	999 Graduate Research Horticulture and Crop Science (1)	1	100%	No	No	No	Other
Spring 2010	999 Graduate Research, Horticulture and Crop Science (3)	1	100%	No	No	No	Other
Winter 2010	HCS 693 Professional Development (1)	4	100%	No	No	No	Didactic
Winter 2010	HCS 488 Professional Development (1)	28	100%	No	No	No	Didactic
Winter 2010	999 Graduate Research, Horticulture and Crop Science (16)	1	100%	No	No	No	Other
Winter 2010	999 Graduate Research, Horticulture and Crop	1	100%	No	No	No	Other

	Science (10)						
Winter 2010	999 Graduate Research, Horticulture and Crop Science (18)	1	100%	No	No	No	Other
Winter 2010	999 Graduate Research, Horticulture and Crop Science (3)	1	100%	No	No	No	Other
Fall 2009	HCS 401.02 Environmental Horticulture Organization in Ohio (1)	19	100%	No	No	No	Other
Fall 2009	HCS 806 Methods in Plant Science (2)	2	100%	Yes	No	No	Other
Fall 2009	999 Graduate Research, Horticulture and Crop Science (16)	1	100%	No	No	No	Other
Fall 2009	999 Graduate Research Horticulture and Crop Science (10)	1	100%	No	No	No	Other
Fall 2009	999 Graduate Research, Horticulture and Crop Science (14)	1	100%	No	No	No	Other
Fall 2009	999 Graduate Research, Horticulture and Crop Science (3)	1	100%	No	No	No	Other
Summer 2009	999 Graduate Research, Horticulture and Crop Science (13)	1	100%	No	No	No	Other
Summer 2009	999 Graduate Research, Horticulture and Crop Science (18)	1	100%	No	No	No	Other
Summer 2009	999 Graduate Research, Horticulture and Crop Science (18)	1	100%	No	No	No	Other
Summer 2009	999 Graduate Research, Horticulture and Crop Science (3)	1	100%	No	No	No	Other
Spring 2009	HCS 431 Herbaceous Plant Materials (4)	20	5% Guest lecture on weed control	No	No	No	Didactic
Spring 2009	999 Graduate Research, Horticulture and Crop Science (18)	1	100%	No	No	No	Other
Spring 2009	999 Graduate Research, Horticulture and Crop Science (15)	1	100%	No	No	No	Other
Spring 2009	999 Graduate Research, Horticulture and Crop Science (10)	1	100%	No	No	No	Other
Spring 2009	999 Graduate Research, Horticulture and Crop Science (18)	1	100%	No	No	No	Other
Spring	HCS 431 Herbaceous Plant	20	5% Guest	No	No	No	Didactic

2009	Materials (4)		lecture on weed control				
Winter 2009	HCS 488 Professional Development (1)	20	100%	No	No	No	Other
Winter 2009	HCS 693 Professional Development (1)	1	100%	No	No	No	Other
Winter 2009	999 Graduate Research, Horticulture and Crop Science (10)	1	100%	No	No	No	Other
Winter 2009	999 Graduate Research, Horticulture and Crop Science (6)	1	100%	No	No	No	Other
Winter 2009	999 Graduate Research, Horticulture and Crop Science (15)	1	100%	No	No	No	Other
Winter 2009	999 Graduate Research, Horticulture and Crop Science (3)	1	100%	No	No	No	Other
Fall 2008	HCS 401.02 Environmental Horticulture Organization in Ohio (1)	20	100%	Yes	No	No	Other
Fall 2008	HCS 806 Methods in Plant Science (2)	6	100%	No	No	No	Other
Fall 2008	HCS 294 Group Studies (2)	5	5%, Guest lecture on Hispanic nursery work-force	No	No	No	Didactic
Fall 2008	999 Graduate Research, Horticulture and Crop Science (14)	1	100%	No	No	No	Other
Fall 2008	999 Graduate Research, Horticulture and Crop Science (6)	1	100%	No	No	No	Other
Fall 2008	999 Graduate Research, Horticulture and Crop Science (8)	1	100%	No	No	No	Other
Fall 2008	999 Graduate Research, Horticulture and Crop Science (5)	1	100%	No	No	No	Other
Summer 2008	999 Graduate Research, Horticulture and Crop Science (7)	1	100%	No	No	No	Other
Summer 2008	999 Graduate Research, Horticulture and Crop Science (18)	1	100%	No	No	No	Other
Summer 2008	999 Graduate Research, Horticulture and Crop Science (14)	1	100%	No	No	No	Other

Spring 2008	HCS 431 Herbaceous Plant Materials (4)	20	5% Guest lecture on weed control	No	No	No	Didactic
Spring 2008	999 Graduate Research, Horticulture and Crop Science (18)	1	100%	No	No	No	Other
Spring 2008	999 Graduate Research, Horticulture and Crop Science (14)	1	100%	No	No	No	Other
Spring 2008	999 Graduate Research, Horticulture and Crop Science (14)	1	100%	No	No	No	Other
Winter 2008	HCS 488 Professional Development (1)	22	100%	No	No	No	Other
Winter 2008	HCS 693 Professional Development (1)	8	100%	No	No	No	Other
Winter 2008	999 Graduate Research, Horticulture and Crop Science (14)	1	100%	No	No	No	Other
Winter 2008	999 Graduate Research, Horticulture and Crop Science (14)	1	100%	No	No	No	Other
Winter 2008	999 Graduate Research, Horticulture and Crop Science (14)	1	100%	No	No	No	Other
Fall 2007	HCS 401.02 Environmental Horticulture Organization in Ohio (1)	37	100%	No	No	No	Other
Fall 2007	HCS 294 Group Studies (2)	10	5%, Guest lecture on Hispanic nursery employees	No	No	No	Didactic
Fall 2007	HCS 830 Current Topics in Plant Science -"Journal Club" (2)	3	100%	No	No	No	Other
Fall 2007	999 Graduate Research, Horticulture and Crop Science (14)	1	100%	No	No	No	Other
Fall 2007	999 Graduate Research, Horticulture and Crop Science (14)	1	100%	No	No	No	Other
Fall 2007	999 Graduate Research, Horticulture and Crop Science (14)	1	100%	No	No	No	Other
Summer 2007	999 Graduate Research, Horticulture and Crop Science (14)	1	100%	No	No	No	Other
Summer	999 Graduate Research,	1	100%	No	No	No	Other

2007	Horticulture and Crop Science (14)						
Summer 2007	999 Graduate Research, Horticulture and Crop Science (14)	1	100%	No	No	No	Other
Summer 2007	999 Graduate Research, Horticulture and Crop Science (14)	1	100%	No	No	No	Other
Spring 2007	HCS 431 Herbaceous Plant Materials (4)	28	5% Guest lecture on weed control	No	No	No	Didactic
Spring 2007	HCS 610 Weed Control in Horticultural Crops (4)	9	85% - Three other HCS faculty guest lectured 1 hr. each.	Yes	No	No	Didactic
Winter 2007	HCS 488 Professional Development (1)	22	100%	No	No	No	Other
Winter 2007	999 Graduate Research, Horticulture and Crop Science (14)	1	100%	No	No	No	Other
Winter 2007	999 Graduate Research, Horticulture and Crop Science (14)	1	100%	No	No	No	Other
Winter 2007	999 Graduate Research, Horticulture and Crop Science (14)	1	100%	No	No	No	Other
Fall 2006	HCS 401.02 Environmental Horticulture Organization in Ohio (1)	50	100%	No	No	No	Other
Fall 2006	999 Graduate Research, Horticulture and Crop Science (14)	1	100%	No	No	No	Other
Fall 2006	999 Graduate Research, Horticulture and Crop Science (14)	1	100%	No	No	No	Other
Fall 2006	999 Graduate Research, Horticulture and Crop Science (14)	1	100%	No	No	No	Other
Fall 2006	999 Graduate Research, Horticulture and Crop Science (14)	1	100%	No	No	No	Other
Summer 2006	999 Graduate Research, Horticulture and Crop Science (14)	1	100%	No	No	No	Other
Summer 2006	999 Graduate Research, Horticulture and Crop Science (14)	1	100%	No	No	No	Other
Summer 2006	999 Graduate Research, Horticulture and Crop Science (14)	1	100%	No	No	No	Other

Spring 2006	HCS 610 Weed Control in Horticultural Crops (4)	6	85% - Three other HCS faculty guest lectured 1 hr. each.	Yes	No	No	Didactic
Spring 2006	HCS 431 Herbaceous Plant Materials (4)	28	5% Guest lecture on weed control	No	No	No	Didactic
Spring 2006	999 Graduate Research, Horticulture and Crop Science (14)	1	100%	No	No	No	Other
Spring 2006	999 Graduate Research, Horticulture and Crop Science (14)	1	100%	No	No	No	Other
Spring 2006	999 Graduate Research, Horticulture and Crop Science (14)	1	100%	No	No	No	Other
Fall 2005	HCS 401.02 Environmental Horticulture Organization in Ohio (1)	48	100%	No	No	No	Other
Fall 2005	999 Graduate Research, Horticulture and Crop Science (14)	1	100%	No	No	No	Other
Fall 2005	999 Graduate Research, Horticulture and Crop Science (14)	1	100%	No	No	No	Other
Fall 2005	999 Graduate Research, Horticulture and Crop Science (14)	1	100%	No	No	No	Other
Summer 2005	999 Graduate Research, Horticulture and Crop Science (14)	1	100%	No	No	No	Other
Summer 2005	999 Graduate Research, Horticulture and Crop Science (14)	1	100%	No	No	No	Other
Summer 2005	999 Graduate Research, Horticulture and Crop Science (14)	1	100%	No	No	No	Other
Spring 2005	HCS 431 Herbaceous Plant Materials (4)	28	5% Guest lecture on weed control	No	No	No	Didactic
Spring 2005	999 Graduate Research, Horticulture and Crop Science (14)	1	100%	No	No	No	Other
Spring 2005	999 Graduate Research, Horticulture and Crop Science (14)	1	100%	No	No	No	Other
Spring	999 Graduate Research,	1	100%	No	No	No	Other

2005	Horticulture and Crop Science (14)						
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ii) Graduate Student, Numbers Completed and Number Current

Category	Current	Complete
Doctoral Student (Dissertation advisor)	1	4
Masters Student Plan A (Thesis advisor)		5
Masters Student Plan B (Advisor)	None	1
Doctoral Student (Dissertation committee member)	1	4
Doctoral Students (Candidacy examination committee chair)	1	4
Doctoral Students (Candidacy examination committee member)	8	8
Masters Student (Thesis committee member)		1
Masters Student (Examination committee member)		1
Professional Students (Advisor)	None	None
Totals	26	24

i) Doctoral Student (Dissertation advisor)

- 2011-2015 Michele Bigger, Best management practices and design for long-term highway greening. Current Position: OSU PhD Student.
- 2010-2014 Phoebe Gordon, Transplant methods, irrigation, substrates and production environments effects on tree liner out plant survival in harsh environments. Current Position: OSU PhD. Candidate.
- 2008-present Kyle Daniel, Factors affecting bark splitting in nursery caliper trees. Current Position. Nursery and Landscape Extension Associate at Purdue University, West Lafayette, IN, June 2012- present.
- 2007-2010 Dania Rivera, Double cropping tree liners in retractable roof greenhouses. Current Position. Professor at Universidad de Puerto Rico and State Nursery Specialist, Jan. 2011-present.
- 2007-2012 Upender Somireddy, Field evaluations of various herbicide and mulch combinations. Current Position: Unknown. (Completed with Dr. K. Harrison)

ii) Masters Student Plan A (Thesis advisor)

- 2005-2007 Alejandra Acuna, Assessments of the nursery industry workforce – Ohio and beyond. Current Position: Graduated with a PhD, HCS Turfgrass in 2009, Employed at Universidad de Chile and Universidad Catolica de Chile, Turfgrass management instructor and post doc.
- 2003-2005 Michele Bigger, Root hardiness and the influence of DNA herbicides in overwintered containers. Current Position: Landscape Architect, DHM Design Corporation, Boulder, CO. In 2010 Michele returned to OSU to complete a PhD.
- 2002-2004 Sara Lowe, High temperature stress effects on water use and nutrient utilization in container systems. Current Position: Home-maker.
- 2002-2004 Alison Stoven, Development of an Ohio tree liner production system using retractable-roof houses. Current Position: Colorado State University, Extension Horticulturist, Larimer County, Fort Collins, Co. and 2005-2012 PhD Student Colorado State University.
- 2001-2003 Luke Case, Herbicide-treated mulches for ornamental weed control. Current Position: Research Associate II at Ohio State University, Columbus, OH. 2003-present.

iii) Masters Student Plan B (Advisor)

2011-2013 Laura Giese, Deciduous tree shikimic acid levels in roots, leaves and bark tissues following glyphosate applications. Current Position: Horticulturalist. Botanical Pharmaceuticals Co. Napro Research. Sacramento, CA.

iv) Doctoral Student (Dissertation committee member)

2006-2010 Linjian Jiang, Herbicide treated mulch in grape production. The Ohio State University, Columbus, OH; Advisor: Douglas Doohan, HCS
 2004-2008 Jon Sammons, Irrigation strategies in nursery. The Ohio State University, Columbus, OH; Advisor: Daniel Struve, HCS
 2002-2007 Richard Rathjens, Planting depth effects on nursery plants. The Ohio State University, Columbus, OH; Advisor: Davis Sydnor, Natural Resources
 2001-2005 Barbara Fair, The effects of soil compaction on the growth and physiology of *Acer rubrum* and *Acer Xfreemanii* cultivars. The Ohio State University, Columbus, OH; Advisor: James Metzger, HCS

v) Doctoral Students (Candidacy examination committee chair)

2011-2015 Michele Bigger, Best management practices and design for long-term highway greening. Current Position: OSU PhD Student. (Comp exam March 19, 2014)
 2010-2014 Phoebe Gordon, Transplant methods, irrigation, substrates and production environments effects on tree liner out plant survival in harsh environments. Current Position: OSU PhD Candidate.
 2008-present Kyle Daniel, Factors affecting bark splitting in nursery caliper trees. Current Position. Nursery and Landscape Extension Specialist at Purdue University, West Lafayette, IN, June 2012- present.
 2007-2010 Dania Rivera, Double cropping tree liners in retractable roof greenhouses. Current Position. Professor at Universidad de Puerto Rico and State Nursery Specialist, Jan. 2011-present.
 2007-2012 Upender Somireddy, Field evaluations of various herbicide and mulch. Current Position: Unknown.

vi) Doctoral Students (Candidacy examination committee member)

2006-2010 Linjian Jiang, Herbicide treated mulch in grape production. The Ohio State University, Columbus, OH; Advisor: Douglas Doohan, HCS. Current Position: Research Assistant, The Ohio State University, Wooster, OH.
 2004-2008 Jon Sammons, Irrigation strategies in nursery. The Ohio State University, Columbus, OH; Advisor: Daniel Struve, HCS. Vice President Sustane Fertilizer
 2002-2007 Richard Rathjens, Planting depth effects on nursery plants. The Ohio State University, Columbus, OH; Advisor: Davis Sydnor, Natural Resources. '06 failed
 2002-2007 Richard Rathjens, Planting depth effects on nursery plants. The Ohio State University, Columbus, OH; Advisor: Davis Sydnor, Natural Resources. '07 pass. Senior Agronomist, Davey Tree, Kent, OH.
 2001-2005 Barbara Fair, The effects of soil compaction on the growth and physiology of *Acer rubrum* and *Acer Xfreemanii* cultivars. The Ohio State University, Columbus, OH; Advisor: James Metzger, HCS. Current Position: Assistant Professor, North Carolina State University, Raleigh, NC.

vii) Masters Student (Thesis committee member)

2001-2004 Jon Sammons, Bio-stimulants and transplant success of woody ornamentals. The Ohio State University, Columbus, OH; Advisor: Daniel Struve, HCS. Went on for PhD with Dr. Struve.

viii) Masters Student (Examination committee member)

2001-2004 Jon Sammons, Bio-stimulants and transplant success of woody ornamentals. The Ohio State University, Columbus, OH; Advisor: Daniel Struve, HCS. Went on for PhD with Dr. Struve.

Curriculum Development

- i) Joint Ohio State University and Ohio Nursery and Landscape Association (ONLA) Research Day – 2001-2009. The primary outreach of this program was to the ONLA Research Committee; however, the program was open to all nursery and landscape professionals. These programs provided an opportunity for the industry to see the wide variety of research projects occurring at Ohio State University (OSU) and specifically the progress on the projects that they have funded. Since 2009, we have combined the presentations that would have been given at the Research Day as workshops at the OSU Nursery Short Course (NSC) affording OSU researchers, including my graduate student and RA team, the opportunity to communicate with the industry, obtain feedback on their research, set priorities for future research and say thank you for the industry's financial support.
- ii) Study Tour Class HCS 401.02, I created an opportunity for the extension nursery landscape turf team and teaching and research staff to interact with students during the research presentation session of class. In 2011, for the first time we 401.02 to former students now working in the industry to attend and travel with the students. I also added a theme to each year that the 401.02 has been offered that has added focus and emphasis to industry issues and topics.
- iii) In winter 2007, I developed and offered HCS 488 a 4-day class at the OSU Nursery Short Course where students could attend the OSU Nursery Short Course and CENTS trade show for credit and without charge, except for their course registration with OSU. In 2008, we offered a graduate level HCS 693 class for attending the OSU Nursery Short Course which in 2011 became a HCS 806 course offering. These classes represent a seamless blend of extension and teaching at the undergraduate and graduate levels with 114, 13 and 5 students attending 488 (2007-12), 693 (2008-11) and 806 (2012), respectively since inception.
- iv) Organization of OSU Nursery Short Course into tracks by industry sector. Before 2007, industry personnel in various sectors of landscape contracting, landscape design and architecture, retail, nursery, greenhouse, turf, arboriculture, pest management, business management and new plants did not have a clear format to follow. I implemented tracks at the OSU Nursery Short course for these commodity sectors which has become very popular. Spanish sessions at The Ohio State University Short Course and CENTS, 2001-08, were established by me to provide technical information to the Spanish-speaking workforce and also include them in the largest educational program in the state for the nursery/landscape industry. I developed Spanish bus tours, 2002-06, to expose Hispanic workers to nursery operations and broadened their understanding of the nursery industry.
- v) I refashioned HCS 610 which was a class that had not been taught for 10 years in HCS and represented a void in the HCS curriculum. I developed the class from previous extension presentations and trade magazine publications became the course notes, in 2006 I started teaching this 4 credit class to undergraduate and graduate students.

Brief Description of Approach to and Goals in Teaching, Major Accomplishments and Plans for Future in Teaching

My goal is to target teaching and extension activities to current industry priorities and needs. To this end, I conducted industry surveys and interviews, consulted county and regional extension agents and University and government colleagues and identified educational needs in three key areas. Long-term the goal of my teaching is to improve the sustainability of the "green-industry" environmentally and economically through crop diversification, market expansion, increased labor efficiency and ecologically sound cultural practices.

- Labor shortages and maintaining a stable work force - via improved understanding of the backgrounds and technical needs of the Hispanic labor force (which constitutes 80% of the nursery workforce nationally) in order to engage through education. Labor represents 40% of the cost of each production unit; therefore, gains in labor efficiency translate to significant impacts on the industry's economic worth. New Spanish tracks at the OSU NSC were developed and implemented as well as Spanish bus tours, workshops and website articles.
- Transplant survival in urban landscapes – via improved plant production methods, new planting designs and densities and pre-plant program. The average life-span of an urban street tree is 7 years. Less than 60% of trees, in low care (non-stressful) urban environments survive the first five years. Information presented as part of extension presentations, trade articles and peer-reviewed manuscripts have been compiled into a modernized HCS 5533, *Commercial Nursery Operations* curriculum which I taught for the first time in autumn 2012. The material was also used in HCS 4410 *Sustainable Landscape Management* which I taught for the first time in spring 2013.
- Bio-rationale and alternative weed control practices in commercial nurseries and landscapes – via herbicide treated mulches, development of bio-herbicides and bio-controls for liverworts. Environmentally friendly methods for landscape weed control are crucial given public concerns with herbicides and enactment of "cosmetic" pesticide bans outside and inside the US.

Major Accomplishments:

- HCS 401.02, research days and the OSU NSC workshops as revenues for increased interaction and exposure of the ENLTT. These activities have been crucial as in-service training opportunities regarding nursery production. *Starting in 2005*, we have emphasized a specific issue in the industry on each tour such as invasive plants, depth of planting, labor, urban expansion into rural areas and economic constraints. Students have indicated that they appreciated this addition to the tours.
- *2006 New - HCS 610 Weed Control in Horticultural Crops - A class not taught in 10 years.* In horticultural industries, weed control is the number one pest management issue. Despite this, undergraduate and graduate students were receiving no training specific to horticultural crop weed control principles, practices and products. In addition reference materials for HCS 610, HCS 5533 and HCS 4410 developed from industry trade magazine contributions and my regular column "Out and About with Hannah" which has spanned two states and seventeen years. "Out and About" has been an effective way for me to communicate what I've seen and learned at nurseries and landscapes and recent seminars and conferences and has become the reference materials I use when teaching undergraduate and graduate classes.
- *2007 New - HCS 488 Professional Development and 2008 New - HCS 693 – Professional Development:* I developed 488 and added 693 to include graduate students. The purpose of these classes is to give students, via the OSU Nursery Short Course exposure to information industry employees are currently required to learn and via the CENT Show the many possible venues for employment in this field. In the short course, students attend specific pre-selected talks and in the Trade Show students meet working professionals from a cross section of the Landscape Horticulture industry.
- *2012 New – HCS 5533- Commercial Nursery Operations* curriculum which I taught for the first time in

autumn 2012 is developed from industry extension presentations I have given in the past 10 years and reference materials are from trade magazine contributions and my regular column "Out and About with Hannah."

- 2013 New – HCS 4410 – *Sustainable Landscape Management* twelve concepts involved in sustainable landscaping were developed and presented in the class. Materials were developed from tours, visits and reference materials from various regions and landscape operations.
- Over 2,000 registrants in the nursery and landscape industry attended 119 hours of programming including attendees from 25 states outside Ohio and Canada at the OSU Nursery Short Course annually. The 2012-14 programs have had significant increases in attendance in all but two of the 25 areas outside Ohio over the 2011 program. In contrast to many agricultural extension programs predominated by attendees over 50 yr. old the OSUNSC showed a marked increase in the 31 to 45 age group which was also the largest demographic of attendees. The OSUNSC program has held steady in attendance over the past three years during a time of dwindling enrollment and disappearance (due to decline) in similar programs throughout the US and loss of business in the nursery landscape sector and employees. We have also increased speaker quality dramatically in the past three years. My research program and other OARDC scientists' research have kept this program's performance and impact on the industry strong.

Specific goals for the future:

- Increase involvement of county agents and other OSUE professionals in HCS 5533 as in-service training programs and opportunities for students to interact with these personnel.
- Addition of a five state (OH, MI, IN, KY and PA) conference with a graduate student competition at the OSU Nursery Short Course starting 01/ 2013 for industry personnel to find the most recent research emanating from key researchers in the four state area and give graduate students the opportunity to compete regionally for cash prizes and awards.
- Bio-plastic conferences and recycling events hosting.
- Author a Nursery Production textbook the only textbook available *Nursery Management: Administration and Culture*, By Davidson, Mecklenburg and Peterson was last revised in 1999 and does not contain many current systems or procedures.

Evaluation of Teaching

Client and Peer Evaluations. Evaluation of Effective Extension Teaching (EEET) form (Group I) have been conducted 2005- 2011 for extension teaching and data is provided by the Program Development and Evaluation Unit (PDEU) of Ohio State University Extension. The EEET criteria are scored on a scale of 1 to 5, where 1 is strongly disagree, 2 disagree, 3 neutral, 4 agree and 5 is strongly agree. Summaries of the past five years and summaries by year are attached indicating a marked improvement since 2007 from 4.11 to 4.61 which was above the mean for All Extension and Agriculture and Natural Resources Educators. Peer evaluations of extension teaching are also attached indicating a particular strength in conveying technical, specialized information into practical, applied concepts that growers can implement. The EEET have been used to direct my research and extension program to address questions and comments received via these evaluations.

Student Evaluations. Student Evaluations of Instruction (SEI) indicate with the exception of one course evaluation, I was above or within 0.2 points of the comparative instructor mean. I scored higher than average for "Encouraged independent thinking," which is a goal of my program to not just train students but create future industry leaders. I have used the SEIs to improve my organization of courses which has been indicated as a weakness.

Awards and Formal Recognition for Teaching (Extension)

- 2007. State Personnel Service Award in Agriculture and Natural Resources. The Ohio Association of Extension Professionals. Recognition of extension activities as an Ag/NR Extension Specialist in Ohio.
- 1999. Distinguished Educator Award. Presented by: Oregon Association of Nurserymen. In honor of contribution to industry via extension teaching, technical writing and consultations. (Once in a lifetime award; selected by the Oregon Association of Nurserymen Award Committee).

1) Other Academic Advising

2011. HCS Graduate Student Retreat Competition Judge. Wooster, OH.

2007. Ph.D. Graduate Student Presentation and Paper Judge for the Southern Nurserymen's Association Research Conference.

2006. Poster Judge for Denman Undergraduate Research Forum, Agriculture and Environmental Sciences.

2005. Oral and Poster Presentation Judge for the 19th Annual Edward F. Hayes Graduate Research Forum, Agricultural Sciences.

Research

List of Books, Articles, and Other Published Papers

As a member of the American Society for Horticultural Science (ASHS), the International Society of Horticulture Science (ISHS) and the Weed Science Society of America (WSSA), I contribute to oral and poster presentations at annual meetings for each including the regional chapter of WSSA [Northeast Weed Science Society (NEWSS)], publish in proceedings of annual meetings and target my scientific publications to peer-reviewed journals associated with these societies such as *HortScience*, *HortTechnology* (ASHS) ; *ActaHorticulture* (ISHS) and *WeedTechnology* (WSSA).

As an extension specialist, I am also involved in professional industry associations such as the American Nursery and Landscape Association which has a peer-reviewed journal, *Journal of Environmental Horticulture* (JEH) and the International Plant Propagators Society (IPPS) which has annual proceedings. ASHS, ISHS and WSSA scientific publications are the best way to reach my peers at other universities and affiliated industry research companies; however, the ANLA JEH journal is one of my key formats for reaching industry practitioners and nursery/ landscape industry leaders.

My end users are nursery growers and landscape managers who read leading trade magazines such as *American Nurseryman* and *Nursery Management and Production* as well as their regional association magazines such as the Ohio Nursery and Landscape Association, *Buckeye* and Michigan Nursery, Landscape Association, *The Michigan Landscape* and the Ontario Landscapes Trade Association, *Landscape Trades*. These five publications although not peer-reviewed are all editor-reviewed and with the exception of the *Buckeye* (in which I have a regular column) are by invitation only. These five publications are the major means of extending my research to the industry in the US and Canada. These trade publications are listed under *Creative Works – Other Creative Works*.