

Ryan N. Contreras
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A. EDUCATION AND EMPLOYMENT INFORMATION

1. Academic Preparation

2009 Ph.D. University of Georgia, Horticulture, Athens, Georgia.
Interspecific hybridization, ploidy manipulation, and cytological and genetic analyses as tools for breeding and improvement of Callicarpa L., Cryptomeria D. Don., Hibiscus L., and Tecoma Juss.

2006 M.Sc. North Carolina State University, Horticultural Science, Raleigh, North Carolina. *Azaleodendrons: Investigating parentage, fertility, and effects of polyploidy among hybrids of deciduous azaleas and evergreen rhododendrons.*

2002 B.Sc. North Carolina State University, Horticultural Science, Raleigh, North Carolina

2. Employment

2016 – current Associate Professor, Department of Horticulture, Oregon State University, Corvallis, OR

2009 – 2016 Assistant Professor, Department of Horticulture Oregon State University, Corvallis, OR

2002 – 2003 Laboratory Technician, Department of Crop and Soil Science North Carolina State University, Raleigh, NC

B. TEACHING, ADVISING AND OTHER ASSIGNMENTS

1. Instructional Summary

I am the lead or co-lead instructor for 4 site-based courses and 4 online courses and have instructed more than 2,000 students to date. I have made significant contributions to the undergraduate program through course adjustment to better meet the program goals. Additionally, I have developed online versions of my courses to expand the reach of our program.

My primary goal is to be effective in educating students such that they will be successful in future courses and their careers. I have designed my courses with input from other instructors within the Department, industry representatives, and my own experiences. I strive to make the material relevant to each student and relate how it applies to his or her respective career goals. Contributing to this is establishing an organized flow to the course material and setting well-defined course objectives such that students know the path and what is expected. I strive to be flexible to students' needs but still maintain the level of rigor that is characteristic of my teaching program. I address students' individualism by providing numerous methods of instruction and continuing to evolve course assignments to address varying talents and learning styles. A particular point of pride for me in my teaching program is my response to constructive criticism from peers and students. On several occasions I have put into practice new suggested techniques as quickly as the very next class period.

a. Credit Courses
Lead or co-instructor
Campus-based

Course	Title	Enrolled	Term	Year
HORT 311	Plant Propagation	46, 45, 44	W	2019, 18, 17
HORT 301	Biology of Horticulture	34, 58, 55, 55, 62, 60, 65, 66	F	2018, 17, 16, 15, 14, 13, 12, 11
HORT 226	Landscape Plant Mat. I	18, 28, 17, 16, 17, 29, 21, 15, 25	F	2018, 17, 16, 15, 14, 13, 12, 11, 10
HORT 228	Landscape Plant Mat. II	20, 19, 12, 17, 20, 28, 21, 17, 22	S	2018, 17, 16, 15, 14, 13, 12, 11, 10
HORT 505	Ethics in Research	8	S	2015
HORT 405	Propagation and field eval. of <i>Ribes sanguineum</i>	1	S	2014
HORT 412	Career Exploration	31	W	2013
HORT 301	Prin. Hort. Technology	59	F	2010
TOTAL		1005		

Online

Course	Title	Enrolled	Term	Year
HORT 311E	Plant Propagation	46, 43, 37	W	2019, 18, 17
HORT 311E	Plant Propagation	27	F	2016
HORT 301E	Biology of Horticulture	44, 27, 47, 39, 42, 41, 29, 26	F	2018, 17, 16, 15, 14, 13, 12, 11
HORT 301E	Biology of Horticulture	44, 34, 40, 37, 30, 40, 17	S	2018, 17, 16, 15, 14, 13, 12

HORT 226E	Landscape Plant Mat. I	38, 43, 34, 31, 33, 33, 23, 14, 5	F	2018, 17, 16, 15, 14, 13, 12, 11, 10
HORT 228E	Landscape Plant Mat. II	37, 16, 29, 25, 31, 17, 21, 6	S	2018, 17, 2016, 15, 14, 13, 12, 11
TOTAL		1009		

Contributor: I have served as a contributing lecturer 44 times.

Course	Title	Term	Year
HORT 481/581	Case Studies	Spring	2019, 2018
HORT 112	Intro. Hort. Systems, Practices, & Careers	Fall	2018, 17, 16, 15, 14, 13, 12, 11, 10
PBG 450/550	Plant Breeding	Spring	2018, 17, 16, 15, 14, 13, 12, 11, 10
PBG 431	Plant Genetics Recitation	Winter	2019, 18, 17, 16, 15, 14, 13
HORT 412	Career Exploration	Winter	2019, 2016, 2012
HORT 511	Res. & Edu. Persp. in Hort.	Fall	2018, 17, 16, 15, 14, 13, 12, 11, 10
HORT 505	Plants and Patents	Spring	2019, 2017, 2014
PBG 519	Curr. Topics in Plant Breeding and Genetics	Spring	2018, 2013

b. Non-Credit Courses and Workshops

I have presented 31 talks to growers, stakeholders, and the public as part of my outreach.

1. August 23, 2019. Hot off the press! New releases from OSU plant breeding. **Farwest Show.** Portland, OR.
2. August 22, 2019. Time for CRISPR? A look at creating novel ornamentals with gene editing and genetic engineering (GE) techniques. **Farwest Show.**
3. August 21, 2019. Where Do We Go From Here? *Weedy Ornamentals: Breeding, Evaluation, and Regulation.* **Farwest Show.** Portland, OR.
4. August 9, 2019. New Plants from OSU. **Oregon Garden Education Series.** Silverton, OR.
5. March 7, 2019. Tree breeding at OSU. **Shade Tree Growers Meeting.** Aurora, OR.
6. January 8, 2019. The growing dead: plants you thought passé get brought back to life. **Southern Plant Conference.** Baltimore, MD. *Invited speaker.*

7. November 10, 2018. New plants take root in the rich soil of collaboration. **Independent Plant Breeders Conference.** Mobile, AL. *Invited speaker.*
8. August 23, 2018. **Farwest Show Hosted by the Oregon Association of Nurseries.** Portland, OR. *Invited speaker.*
9. July 16, 2018. **Back from the ban: the complex issue of sterile cultivars from invasive species.** Cultivate! 2018 presented by AmericanHort. *Invited and funded speaker*
10. March 21, 2018. Plant Propagation. **Lane County Master Gardener Training.** Eugene, OR.
11. October 19, 2017. The Struggle is Real (but Fun!): Long Term Breeding at a Public University. **International Plant Propagators' Society – Western Region Annual Meeting.** Wilsonville, OR. *Invited speaker.*
12. August 25, 2017. What's New from Oregon State Plant Breeding. **Farwest Show Hosted by the Oregon Association of Nurseries.** Portland, OR. *Invited speaker.*
13. September 7, 2016. New Trees and Shrubs: Aspirations and Accomplishments. **Western Nursery and Landscape Association. Webinar.**
14. June 24, 2016. Study Weekend for the Hardy Plant Society of Oregon – Hosted by the Salem Hardy Plant Society. New Trees and Shrubs: Aspirations and Successes. Salem, OR. *Invited Speaker*
15. March 17, 2016. Not Just a Pretty Face: Breeding Plants that Work. **VNLA Webinar.**
16. March 5, 2016. Seeds of Spring session of Josephine County Master Gardener Association. Developing new landscape plants. Grants Pass, OR. *Invited Speaker*
17. January 21, 2016. Western University at the 2016 Western Nursery and Landscape Association Trade Show. Not just a pretty face: Breeding good looking plants that work. Kansas City, MO. Attendance: *Invited and Funded Speaker*
18. January 23, 2015. Idaho Hort Expo hosted by the Idaho Nursery & Landscape Association. From genes to cool plants. Boise, ID. Attendance: 35 *Invited and Funded Speaker*
19. January 6, 2015. Green and Growin' hosted by the North Carolina Nursery and Landscape Association. Assessing inheritance of ornamental traits. Greensboro, NC. Attendance: 35 *Invited and Funded Speaker*
20. August 21, 2014. Farwest show sponsored by the Oregon Association of Nurseries. From genes to cool plants. Portland, OR. Attendance: 50.
21. January 9, 2014. Master Gardener Training. Tangent, OR. Botany Basics for Gardeners. Attendance: 35
22. November 6, 2013. Oregon Shade Tree Growers Meeting. Aurora, OR. Progress on shade tree development at OSU. Attendance: 25
23. August 24, 2012. Farwest Show sponsored by the Oregon Association of Nurseries. Ornamental Plant Breeding at Oregon State University. Portland, OR. Attendance: 75+
24. July 16, 2012. Northwest Nursery Research Day. Breeding for the Valley and beyond. Silverton, OR. Attendance: 63

25. November 2, 2011. Shade Tree Growers Meeting. Shade Tree Breeding at OSU. NWREC, Aurora, OR. Attendance: 25.
26. February 23, 2011. Master Gardener Mini-College. Reigning in Rogues Revisited: Developing Sterile Forms of Nursery Crops. The Dalles, OR. Attendance: 30.
27. September 7, 2010. Nursery Research and Extension Day. Introduction to the Ornamental Plant Breeding Program at OSU. NWREC OSU, Aurora, OR. Attendance: 46
28. July 30, 2010. Master Gardener Mini-College - Reigning in Rogues: Developing Sterile Forms of Nursery Crops. Corvallis, OR. Attendance: 18.
29. June 24, 2010. Oregon Department of Agriculture Nursery Certification Staff Meeting. Ornamental Plant Breeding at Oregon State University. Salem, OR. Attendance: 22.
30. June 2, 2010. Seed to City: The Journey of an Urban Tree - Discussion on interaction of the OSU Nursery Breeding Program and the nursery industry. Boring, OR. Attendance: 105
31. June 3, 2010. Seed to City: The Journey of an Urban Tree - Trends in Nursery Crop Development. Silverton, OR. Attendance: 113

c. Curriculum Development

- Review Category I and II proposals in role as Graduate Council representative from College of Agricultural Sciences and as Graduate Council Chair.
- Regularly review options within Horticulture major. Led revision of Plant Breeding and Genetics option to create more flexibility for students to tailor degree program.
- Successful Category II proposal to change the name of HORT 301 – The Biology of Horticulture to HORT 301 – Growth and Development of Horticultural Crops. Fall 2017.
- Submitted a Category II with Shawn Mehlenbacher to establish PBG 551 – Breeding Clonal Crops as a permanent course Fall 2014 (first offered at PBG 551 - Fall 2016)
- College of Agricultural Sciences Curriculum and Assessment Committee – 2013 – 2016.
- Helped develop and establish graduate Plant Breeding and Genetics Option in Departments of Horticulture and Crop and Soil Science - 2013
- Helped develop and establish undergraduate Plant Breeding and Genetics Option in Departments of Horticulture and Crop and Soil Science - 2012
- Three Category II proposals approved Winter 2011
 - HORT 226 increased from 3 to 4 credits; material increased to offset removal of HORT 227
 - HORT 228 increased from 3 to 4 credits; material increased to offset removal of HORT 227
 - HORT 301 name changed from Principles of Horticultural Technology to The Biology of Horticulture; material altered to reflect feedback of upper division instructors
- HORT 226 Online, Developed Summer 2010; offered Fall 2010

- HORT 228 Online, Developed Winter 2011; offered Spring 2011
- HORT 301 Online, Developed Summer 2011; offered Fall 2011
- Undergraduate Curriculum Committee, December 2009 – present

d. Undergraduate advising/directing: I have served as a mentor to 17 students conducting research projects and served on one Undergraduate Honors Thesis committee.

Thesis

- Wilhelm, L. 2019. Assessing ploidy variation of *Berberis nervosa* over its geographic distribution. URSA Engage participant mentor.
- Seely, T. 2018. Oregon State University Undergraduate International Research Thesis. Developing haploids of *Prunus laurocerasus* using anther culture. *Mentor*.
- Jeknic, S. 2015. Oregon State University Undergraduate Honors Thesis. Alteration of flower color in *Solanum lycopersicum* through ectopic expression of a gene for capsanthin-capsorubin from *Lilium lancifolium*. *Committee member*.
- Haddad, A. 2015. Oregon State University Undergraduate Research Thesis. Comparing methods of sample handling and preparation in genome sizing of *Acer* using flow cytometry. *Mentor*.
- Doyle, T. 2013. Oregon State University Undergraduate Thesis Research. In situ chromosome doubling of four Oregon native plants of varying growth forms. *Mentor*.
- Cummings, C. Summer 2011-Spring 2012. Oregon State University Undergraduate Research. Viability and longevity of *Prunus laurocerasus* and *P. lusitanica* pollen under varying storage conditions. *Mentor*.

Independent Research and Interns

- Ashcraft, J. 2018-. Phenology of the *Acer* collection in the Ornamental Plant Breeding Program.
- Sasso, J. 2018. Non-targeted mutagenesis of *Spiraea douglasii*: assessing germination, growth, and morphology of plants after exposing seeds to varying concentrations of EMS.
- Woodworth, P. 2018. Determining ploidy levels of seedlings from tetraploid and cytochimeric parents of various taxa: Observations from Amur & Norway maple and bigleaf hydrangea.
- Hamblin, Q. 2017-18. Assessing morphology of a ploidy series in crabapple and determining ploidy level of open-pollinated seedlings.
- Alanko, G. 2017. Determining ploidy levels of Amur and Norway maple seedlings.
- Boensma, M. Spring-Summer 2016. International Intern from Holland. Inheritance of floral and foliar traits in *Ribes sanguineum*.
- Reeve, R. Fall 2014. Oregon State University Undergraduate Research Experience (non-credit). Comparing methods of application of two mitotic inhibitors in vivo to induce chromosome doubling of *Hibiscus syriacus*.

Quinones, G. Fall 2014 – present. Oregon State University Undergraduate Research Experience (non-credit). Mutagenesis of *Carpenteria californica* using varying rates of gamma radiation.

Chan, M. Summer 2013 – Summer 2014. Oregon State University Undergraduate Research Experience (non-credit). Field evaluation and herbarium voucher collection for 49 species of *Cotoneaster*.

Pham, T. Spring 2013. Oregon State University Undergraduate Research Credits. In vitro polyploidization of *Hydrangea macrophylla*.

Lukowski, K. Summer 2012. Oregon State University Summer Intern. Mapping the woody flora of Oregon State University

Hollis, I. Summer 2009, Clackamas Community College, OR
Propagation and cataloguing newly received accessions for the Ornamental Plant Breeding Program

e. Graduate students advised/directed: Major or co-major professor for 3 Ph.D. students and 4 M.S. students. Committee member of 6 M.S. and 1 Ph.D. students. Graduate Council Representative (G.C.R.) for 6 M.S. students and 9 Ph.D. students.

<u>Student</u>	<u>Dept.</u>	<u>Role</u>	<u>Degree</u>	<u>Year of Graduation</u>
C. Brock	HORT	Major Prof	M.S.	2022 (anticipated)
K. Neill	HORT	Major Prof	M.S.	2020 (anticipated)
H. Chen	HORT	Major Prof	Ph.D.	2018
J. Lattier	HORT	Major Prof	Ph.D.	2017
J. Schulze	HORT	Major Prof	M.S.	2017
K. Shearer-Lattier	HORT	Major Prof	M.S.	2016
J. Rothleutner	HORT	Major Prof	M.S.	2012
G. Wang	CROP	Co-Major Prof	Ph.D.	2010

<u>Student</u>	<u>Dept.</u>	<u>Role</u>	<u>Degree</u>	<u>Year of Graduation</u>
J. Stevenson	FES	G.C.R.	Ph.D.	2020 (anticipated)
J. Petter	FES	Comm Member	M.S.	2018
R. Lenz	BPP	G.C.R.	Ph.D.	2020 (anticipated)
G. Komaei Koma	HORT	Comm Member	Ph.D.	2019 (anticipated)
O. Urhan	FES	G.C.R.	Ph.D.	2018 (anticipated)
O. McMurtey	WRM	G.C.R.	M.S.	2018
I. Sandlin	BPP	Comm Member	M.S.	2018
S. Fuller	MCB	Comm Member	M.S.	2017
A. Graham	HORT	Comm Member	M.S.	2016
S. Greenleaf	FES	G.C.R.	M.S.	2016
B. Mirzaei	WSE	G.C.R.	Ph.D.	2016
B. Greer	FES	G.C.R.	Ph.D.	2017
D. Marias	FES	G.C.R.	Ph.D.	2016
E. Rowley	MCB	G.C.R.	Ph.D.	2016
L. Gryczkowski	WRE	G.C.R.	Ph.D.	2015
N. Al-Bader	HORT	Comm Member	M.S.	2014

J. Miskella	CROP	Comm Member	M.S.	2014
V. Petro	FES	G.C.R.	M.S.	2013
B. Saffell	FES	G.C.R.	M.S.	2013
A. Claiborne	FSW	G.C.R.	M.S.	2013
T. Kim	AEC	G.C.R.	Ph.D.	2012
M. McGlinchy	FS	G.C.R.	M.S.	2011
M. Nadeem	Iraq	Intl. Review	Ph.D.	2011

f. Collaborative Teaching

- I have served as a contributor in 41 courses during 2010-18
- Co-taught 1 course (HORT 412) during winter 2013 with Kelly Donegan
- Survey of student study techniques in HORT 226 and HORT 228 with Rob Golembiewski, previously Assistant Professor, Department of Horticulture, and Jonathan Velez, Assistant Professor, Department of Agriculture Education to determine if there is a correlation between study methods and student performance. Manuscript was published in HortTechnology.

2. Student Evaluation: My student evaluation of teaching has been positive and shown an increasing trend since my first course offerings. Recent, positive feedback has commented on my enthusiasm, organization, and clear goals for student learning. Course SET rates the course overall and Instructor SET addresses my contribution to courses.

Campus-based (mean scores for HORT and CAS combined Ecampus and on campus)

Course	Term	Respondents	Course SET*			Instructor SET*		
			Contreras	Hort	CAS	Contreras	Hort	CAS
Hort 301	F18	13	4.6	5.6	5.4	5.0	5.6	5.6
Hort 226	F18	6	5.7	5.6	5.4	6.0	5.6	5.6
Hort 228	S18	5	5.9	5.4	5.3	5.7	5.5	5.5
Hort 311	W18	12	5.6	5.5	5.3	5.8	5.6	5.5
Hort 301	F17	25	5.0	5.5	5.4	5.3	5.5	5.5
Hort 226	F17	10	5.3	5.5	5.4	5.6	5.5	5.5
Hort 228	S17	9	5.4	5.4	5.2	5.7	5.5	5.4
Hort 311	W17	24	4.9	5.1	5.2	5.0	5.3	5.4
Hort 301	F16	33	5	5.1	5.3	5.1	5.3	5.4
Hort 226	F16	9	5.5	5.1	5.3	5.7	5.3	5.4
Hort 228	S16	7	5.5	5.3	5.2	5.5	5.3	5.3
Hort 301	F15	35	5.1	5.4	5.2	5.5	5.5	5.4
Hort 226	F15	10	5.9	5.4	5.2	5.9	5.5	5.4
Hort 505	S15	6	5.8	5.5	5.1	5.8	5.6	5.3
Hort 228	S15	7	5.3	5.5	5.1	5.6	5.6	5.3
Hort 301	F14	42	5.2	5.4	5.2	5.5	5.5	5.4
Hort 226	F14	9	5.4	5.4	5.2	5.9	5.5	5.4
Hort 228	S14	6	5.7	5.5	5.1	6	5.6	5.2
Hort 301	F13	42	5.2	5.3	5.4	5.7	5.5	5.5
Hort 226	F13	19	5.6	5.3	5.4	5.6	5.5	5.5
Hort 228	S13	20	5.6	5.2	5.2	5.8	5.5	5.4

Hort 412	W13	12	5.6	5.3	5.3	5.8	5.5	5.5
Hort 301	F12	50	5	5.1	5.3	5.3	5.2	5.5
Hort 226	F12	13	5.4	5.1	5.3	5.9	5.2	5.5
Hort 228	S12	11	5	5.3	5	5.1	5.4	5.1
Hort 301	F11	52	4.5	5.3	5	4.8	5.5	5.2
Hort 226	F11	7	5.3	5.3	5	5.6	5.5	5.2
Hort 228	S11	18	5.2	5.3	4.8	5.1	5.5	5.1
Hort 301	F10	57	3.9	4.8	5	4.1	5.3	5.3
Hort 226	F10	20	4.8	4.8	5	5.3	5.3	5.3
Hort 228	S10	20	3.8	4.9	4.9	4.4	5.2	5.1

Online (mean scores for HORT and CAS are Ecampus only)

Course	Term	Respondents	Course SET*			Instructor SET*		
			Contreras	Hort	CAS	Contreras	Hort	CAS
Hort 301e	F18	22	5.6	5.5	5.4	5.5	5.4	5.5
Hort 226e	F18	10	5.5	5.5	5.4	5.1	5.4	5.5
Hort 301e	S18	8	5.7	5.3	5.3	5.5	5.3	5.5
Hort 228e	S18	14	4.5	5.3	5.3	3.8	5.3	5.5
Hort 311e	W18	15	5.5	5.3	5.3	4.5	5.3	5.5
Hort 226e	F17	20	4.7	5.4	5.3	4.8	5.4	5.5
Hort 301e	F17	10	5.5	5.4	5.3	5.5	5.4	5.5
Hort 301e	S17	16	5.6	5.3	5.3	5.4	5.3	5.4
Hort 228e	S17	4	5.0	5.3	5.3	5.0	5.3	5.4
Hort 311e	W17	17	5.1	5.2	5.2	4.5	5.4	5.4
Hort 311e	F16	15	5.4	5.4	5.2	5.3	5.4	5.3
Hort 301e	F16	24	5.6	5.4	5.2	5.6	5.4	5.3
Hort 226e	F16	18	5.5	5.4	5.2	5.8	5.4	5.3
Hort 301e	S16	24	5.3	5.3	5.2	4.9	5.3	5.3
Hort 228e	S16	15	4.4	5.3	5.2	3.6	5.3	5.3
Hort 301e	F15	19	5.3	5.5	5.3	5.5	5.6	5.5
Hort 226e	F15	17	4.8	5.5	5.3	4.8	5.6	5.5
Hort 301e	S15	11	4.2	5.2	5.2	4.5	5.3	5.3
Hort 228e	S15	15	4.6	5.2	5.2	4.4	5.3	5.3
Hort 301e	F14	20	5.0	5.4	5.2	5.0	5.5	5.4
Hort 226e	F14	14	4.9	5.4	5.2	4.5	5.5	5.4
Hort 228e	S14	11	4.9	5.4	5.2	5.1	5.4	5.2
Hort 301e	S14	18	4.4	5.4	5.2	4.6	5.4	5.2
Hort 301e	F13	22	4.3	5.4	5.3	4.3	5.4	5.3
Hort 226e	F13	11	4.9	5.4	5.3	4.8	5.4	5.3
Hort 301e	S13	17	4.9	5.5	5.3	4.8	5.5	5.2
Hort 228e	S13	8	5.7	5.5	5.3	5.7	5.5	5.2
Hort 301e	F12	17	4.6	5.3	5.2	4.4	5.4	5.3
Hort 226e	F12	13	5	5.3	5.2	5.4	5.4	5.3
Hort 301e	S12	12	4.9	5.4	5.1	5	5.6	5.2
Hort 228e	S12	17	4.6	5.4	5.1	4.3	5.6	5.2

Hort 226e	F11	4	4.8	5.3	4.6	4.1	5.4	4.4
Hort 301e	F11	15	4	5.3	4.6	3.8	5.4	4.4
Hort 228e	S11	7	5.5	#	#	5.5	#	#
Hort 226e	F10	2	4	#	#	3	#	#

*Ratings are medians on a scale of 1-6: 1 = very poor; 6 = excellent

#Indicates that statistics were not available.

3. Peer Teaching Evaluations

- HORT 301 will be peer reviewed during 2019.
- HORT 311 will be peer reviewed during 2019.
- Hort 228 was fully peer reviewed during Spring 2015 by John Lambrinos (Chair), Alexander Kowalewski, and Jennifer Parke. Reviews were very positive.
- Hort 301 was fully peer reviewed during Fall 2012 by Richard Regan (Chair), Bernadine Strik, and Andrew Hulting. Reviews were very positive.
- In class evaluations were conducted for Hort 226 during Fall 2011 by Rob Golembiewski (HORT) and James Cassidy (CSS).

4. Advising

- I serve as a faculty mentor as part of the Faculty Student Mentor Program that was launched in 2018 as part of the Student Success Initiative. I have four students that are in their first year at OSU with whom I meet regularly.
- In 2012 I established the Alpha Rho Chapter of Pi Alpha Xi (The Honor Society of Horticulture) for undergraduate and graduate students. Since then I have served as the Faculty Advisor for our chapter. Pi Alpha Xi recognizes scholarly achievement of undergraduate students by inviting those that have at least a 3.0 GPA and Junior class standing to join. Graduate Students are also eligible and have been very active in the Alpha Rho Chapter. Our organization has conducted many scholarly and service activities including having invited speakers each term, supporting the Community Services Consortium (CSC) Youth Garden, and adopting a section of Oak Creek that we maintain and help beautify. The following are the number of undergraduate and graduate students initiated each year.
 - 2012 – 21
 - 2013 – 13
 - 2014 – 14
 - 2015 – 8
- I mentor undergraduate students regarding internships, employment, and courses. My role is primarily to help students identify nursery industry opportunities for internships or full time positions and I have used my contacts to successfully place several students. Since the inception of the undergraduate Plant Breeding and Genetics option, I have served in a liaison capacity to help undergraduates link with research faculty. I review and score internship reports for students in areas related to plant breeding and/or the nursery industry. Related to this, I regularly meet with nursery industry representatives to discuss how we can better connect our students with the industry via internships or permanent employment opportunities. Anecdotally, I have observed that mine and others' efforts are encouraging more students to consider the nursery industry as a viable employment option.

5. Other Assignments

a) Research. My research program has been developed using input from a group of industry representatives in order to best meet the needs of the industry. More recently, a formalized Ornamental Plant Crop Advisory Committee was assembled to provide direct input on potential and proposed plants for release and intellectual property protection. The Committee includes four members of industry including retail, propagation, breeding, and shade trees. Along with valuable input from the group I use my own knowledge of plant material and available cultivars to determine specific research needs and where my program's efforts are best used. Broadly, the program focuses on cultivar development of nursery crops. Fundamental research is conducted to support the applied plant breeding program. Primary activities of this program are to: 1) develop sterile forms of economically important crops with invasive tendencies; 2) improve the insect and disease tolerance of nursery crops; and 3) improve the landscape utility and aesthetics of the crops of interest. My program is extramurally funded with intra- and inter-departmental collaborators at OSU as well as national collaborators at other universities and the USDA. My research aligns well with the mission, values, and areas of excellence of the College of Agricultural Sciences as well as the three Signature Areas of the University.

THEME 1. Healthy Environments and Healthy Economies: Controlling the Spread of Nursery Crops into Native Ecosystems

A number of the same traits that make nursery crops successful also allow some of these species to become naturalized or even invasive. Some states have begun banning some species in an attempt to limit the negative ecological impact that they pose. However, breeding for sterility provides a benefit growers by allowing them to continue growing and marketing profitable plants, while also benefiting the environment by reducing the potential of these species to displace native flora.

PROJECT 1. Inducing sterility in *Prunus laurocerasus* and *P. lusitanica*

Situation. Common cherrylaurel (*P. laurocerasus*) and Portugese cherrylaurel (*P. lusitanica*) are rugged plants and fill a number of roles in modern landscapes.

Unfortunately, they have both become naturalized in Western Oregon and Washington to the point that they are receiving attention as potentially invasive. However, in 2011, common cherrylaurel production in Oregon was estimated to be worth more than \$16 million.

Program Effort. We are using two techniques to develop sterile forms of these species; interspecific hybridization and ploidy manipulation. Numerous polyploids have been developed using in vitro treatments. We are still waiting for the induced polyploids to flower and they will be evaluated for fertility at that time. We have made nearly 10,000 interspecific crosses between these species but we have recovered no hybrids to date, though we have recovered many fruit. Thus, we developed polyploid forms of portugese cherrylaurel, which are closer in chromosome complement to common cherrylaurel, to facilitate crossing.

Outputs and Impacts. Numerous polyploids of common and portugese cherrylaurel are being evaluated. Growers widely identify this project as a high priority, as we hope that if

we can recover a hybrid that in addition to sterility, it may also exhibit shothole disease resistant forms.

Related Scholarship. One poster was presented at the 2013 National ASHS meeting. One undergraduate student conducted her undergraduate research project on related research. A prior M.S. student (Justin Schulze) conducted his master's thesis on this project and we have published two peer-refereed papers in HortScience and one in HortTechnology. \$52,937 received to conduct this research from the Agricultural Research Foundation and Oregon Department of Agriculture (ODA). Additional funds have been received as part of ODA grants on which multiple projects are combined.

PROJECT 2. Developing sterile maples

Situation. Maples such as Norway maple, amur maple, and sycamore maple are adaptable to multiple environments, tolerant of urban conditions, are drought tolerant, and are available in varying forms that fill many landscape needs. With the loss of ash as a viable crop to be marketed in the Midwest and eastern USA due to emerald ash borer, it is more important than ever to have alternative shade trees to fill the void. Unfortunately, some maple species such as these have become invasive and have been banned in several states.

Program Effort. We developed over 100 tetraploid norway maple seedlings, 9 tetraploid trident maples, 5 tetraploid amur maples, and 25 hedge maples. In 2016, we recovered more than 4,600 seed of putative triploids of Norway, Amur, and trident maples. Norway and amur maple seedlings were 87% and 84% triploid, respectively. No trident maple seedlings germinated. Triploids will be evaluated for fertility.

Outputs and Impacts. Results and progress have been presented to growers. Stability of our tetraploids provides confidence that we will be able to produce triploids. Growers regularly indicate they will adopt sterile triploids when they are released. This project is one that has helped establish the program as highly engaged with the industry and demonstrates our commitment to improving the economic and ecological success of Oregon growers.

Related Scholarship. An oral presentation was made at the Annual Conference of the Amer. Soc. Hort. Sci. in 2017 and a HortScience article will be prepared to describe developing triploid maples. I have received \$99,485 in competitive grants to conduct this research. Additional funding from ODA was received as part of grants that include several taxa in this theme area.

PROJECT 3. Assessing genome size and ploidy levels in maples

Situation. Polyploid forms of several species of maple have been identified and we believe there likely are many more natural polyploids that could be used in a breeding program (**Theme 1, Project 2**). If we are able to avoid having to generate our own polyploids in the breeding program, then we could shorten the time required for this program by many years. Furthermore, this approach is promising for developing novel phenotypes and/or combining interesting traits from various taxa.

Program effort. We have screened more than 190 accessions of over 40 species and identified mostly diploids but also putative triploids, tetraploids, and hexaploids; some of which are being characterized for the first time. Furthermore, we are using modified protocols of sample and standard handling that we believe may become a new standard for future studies.

Outputs and Impacts. We will further evaluate the accessions identified as triploids and begin including the tetraploids in our breeding program in 2016, or as soon as they flower.

Related Scholarship. One undergraduate thesis project and part of one M.S. thesis. One publication was published in J. Amer. Soc. Hort. Sci. in 2018.

PROJECT 4. Developing sterile cotoneaster hybrids

Situation. Cotoneasters are hardy species that are drought tolerant and provide year-round interest in the garden. Unfortunately, they are often weedy to the point of becoming naturalized or even invasive in Western Oregon and Northern California. Sterile forms would provide an ecologically friendly version of a hardy and low input landscape plant.

Program Effort. Parental species have been identified based on 1) ornamental characteristics such as leaf and floral morphology, 2) ploidy level and, 3) fire blight resistance (**Theme 2, Project 1**). Pollination was conducted on the first diploid species to flower in 2011 (*Cotoneaster* × *suecicus* ‘Coral Beauty’). We have recovered numerous triploid hybrids, including using a highly resistant species as a parent. We have confirmed hybridity using flow cytometry and complete fire blight resistance in two superior genotypes. Fertility of confirmed hybrids is nil – we have had fruit set but no seedlings recovered from F₁ plants.

Outputs and Impacts. Hybrids have been confirmed as triploids that have shown complete fire blight resistance in our glasshouse trials. Cultivars are being evaluated by almost 10 nurseries and at three other universities to test for adaptability. Results from University of California – Davis trials have demonstrated the extreme drought resistance of ‘OSUCOT1’. Low fertility, disease resistant, and drought tolerant shrubs result in ease of production for growers and resilient landscape shrubs that require few inputs. Several nurseries have already signed licenses for ‘OSUCOT1’.

Related Scholarship. M.S. thesis research of Joseph Rothleitner. Two posters were presented at the ASHS National Meeting in September 2011 and August 2012. One manuscript was presented at the Southern Nursery Association Research Conference in August 2015. Two peer refereed publications have been published and a more detailed publication describing the heritability of fire blight resistance as well as releases of cultivars will be published in HortScience. ‘OSUCOT1’ was released August 2018 and has a plant patent applied for.

THEME 2. Improvement of Insect and Disease Resistance of Nursery Crops

Nursery crops experience myriad stresses during production and in the landscape, including biotic factors such as insects and diseases, as well as abiotic stresses such as cold, drought,

and pollution that increase susceptibility. Variation within and among species has been observed for ability to withstand all of these pressures and it is this variation that allows us to breed for improved pest and disease resistance.

PROJECT 1. Breeding for fire blight resistance in cotoneasters

Situation. Fire blight is a serious problem on cotoneasters grown in the Eastern and Southeastern US and Oregon ships approximately 80% of its nursery stock out of state. Therefore, even though fire blight pressure is relatively low in the Willamette Valley where many nurseries are located, it is important that our crops have resistance to the increased disease pressure they will face where end users are located.

Program Effort. We screened 52 species of *Cotoneaster* and have identified numerous sources of resistance. We made several hundred crosses in 2011, 2013, 2014, and 2017 using resistant tetraploid species as pollen parents with a susceptible diploid species that is the industry standard. Many triploid progeny have been recovered and were evaluated for fire blight resistance in 2014. In 2016 we will begin screening seedlings without asexually propagating replicates, which will reduce breeding time.

Outputs and Impacts. We have identified a number of sources of resistance. Our study represents the most comprehensive fire blight screen of the genus *Cotoneaster* that has been conducted to date. Data are being used to design additional crosses to develop new cultivars with disease resistance and superior landscape characters. ‘OSUCOT1’ is disease resistant and was released August 2018. A plant patent has been applied for.

Related Scholarship. Three peer-refereed manuscripts; one on disease screening, one on heritability of resistance, and another cultivar release. It is likely more cultivar releases will follow. Findings were presented at the 57th Annual Southern Nursery Association Research Conference in Mobile, AL, January, 2012, as a poster at the 2012 ASHS National Conference, and I was an invited speaker at the 13th ISHS Fire Blight Workshop in Zurich, Switzerland, where I spoke about this breeding program. Publication on disease screening was published in HortScience 2014. Another

THEME 3. Improving Landscape Performance and Aesthetics of Nursery Crops

The major focus of my breeding program is to address issues of sterility and biotic and abiotic stress in ornamentals; however, there is also a need in the nursery industry for new and exciting forms of economically important crops. New cultivars generate excitement in consumers and boost sales.

PROJECT 1. Developing improved forms *Thuja occidentalis*, *T. plicata*, and *Platycladus orientalis* (Cupressaceae)

Situation. American arborvitae (*Thuja occidentalis*), western red cedar (*T. plicata*), and oriental arborvitae (*Platycladus orientalis*) are commonly grown conifers that all share the same tendency to discolor during winter. This winter browning occurs due to photoinhibition and has been shown to be reduced in polyploid forms Japanese-cedar, which is a related species. We hypothesized that a similar reduction in winter browning would occur in polyploids of these species; however, we have not observed any effect on winter

foliage color. However, there are altered growth forms that nurseries are interested in. American arborvitae, in particular, are produced and sold by the millions in Oregon. If an improved cultivar is developed it could be sold for a premium and give Oregon growers a competitive edge.

Program Effort. In 2010, we developed 32, 64, and 212 polyploids of *Platycladus orientalis*, *Thuja plicata*, and *Thuja occidentalis*, respectively. These polyploids are being grown alongside controls and will be propagated and evaluated for winter browning and overall field performance. Several selections show promise.

Outputs and Impacts. Polyploids developed in my program are unique among cultivars available in the trade. Progress is also being shared at grower meetings and field days.

Related Scholarship. One peer-refereed manuscript was published in HortScience. Strong potential for selections to be patented.

PROJECT 2. Mutation Breeding of shrubs and herbaceous perennials.

Situation. New cultivars are the lifeblood of the nursery industry and historically many of these have arisen as branch sports, which are chance mutations. Mutation breeding offers a more rapid way to induce mutations such as different flower color, growth form, or leaf variegation that may increase the marketability some plants.

Program Effort. We selected two shrubs that are common in landscapes of the Pacific Northwest as well as one herbaceous perennial that is relatively rare in production. Each would benefit from mutations to improve their ornamental characteristics and treated seeds of each with ethyl methanesulfonate (EMS), a chemical mutagen, to develop the first mutation generation (M_1). *Sarcococca confusa*, commonly known as sweetbox, was treated to induce varying growth forms, leaf variegation, and alternate fruit colors. *Ribes sanguineum*, or flowering currant, was treated to induce more compact forms, as was *Galtonia candicans*. The latter, cape hyacinth, is drought tolerant and highly ornamental but lodges and is too tall for modern landscapes. Hundreds of first mutation generation plants of each are being grown and variants have been selected from these populations. Seed were collected from sweetbox in 2013 and flowering currant and cape hyacinth in 2015, and the second mutation generation (M_2) will be observed and variants selected.

Outputs and Impacts. We have identified a variegated form of sweetbox and a number of dwarf forms. We propagated 6 selections in 2013; strong interest was expressed from industry representatives. We also have identified free-branching, cut-leaf that was released in March 2014 as 'Oregon Snowflake'. We are working on cultivars with similar habit and leaf morphology that have pink and red flowers, respectively, to compliment the white flowers of 'Oregon Snowflake'. Several selections of cape hyacinth were selected and propagated in 2014. Observations are ongoing.

Related Scholarship. Three peer-refereed manuscripts will be prepared on the effect of EMS on plant growth and morphology, one for each species included. The release for 'Oregon Snowflake' flowering currant was published in HortScience January 2014 and US

Plant Patent 26763 was granted. I expect several additional releases from these programs. The work on cape hyacinth was part of Kim Lattier's thesis.

PROJECT 3. Breeding for reblooming, disease resistant lilacs.

Situation. Since the release of 'Endless Summer' hydrangea, the industry has made a strong push toward marketing of remontant (reblooming) forms of various taxa. With the release of 'Bloomerang' lilac, a major step forward was taken. Previous selections such as 'Josee' were unimpressive in their ability to rebloom after initial flush of flowers in spring. While 'Bloomerang' is an improvement, greater gains can be made in resistance to *Pseudomonas syringae*, diversity of flower colors, and adaptability to the heat of the southeast.

Program Effort. Controlled crosses were initiated in 2011 to combine the reblooming trait of 'Bloomerang' with diverse flower colors and adaptability of cultivars such as 'Palibin' and 'Miss Kim'. 'Miss Kim' in particular, offers the opportunity to develop a form adaptable to a wide area of the country, including the south where few lilacs thrive. Crosses were continued in 2012, and a large number of hybrids were recovered that are being grown. In 2013, Ph.D. student Jason Lattier began working on this project and it has expanded to attempt intersectional crosses to take advantage of the diversity of traits. We made over 20,000 crosses in 2013-2014. We have intersectional crosses (*Villosae* x *Pubescentes*) as well as extremely precocious seedlings that flowered in less than one year from seed; these seedlings likely will be reblooming, which is an extremely sought after trait. We expanded our work to include using molecular techniques such as genotyping by sequencing (GBS) to develop a linkage map and hope to identify a marker associated with reblooming and blight resistance.

Outputs and Impacts. We determined that remontant flowering in *Syringa* Series *Pubescentes* is likely controlled by two genes – at least we have identified two SNPs associated with the trait. This will allow more targeted breeding for this trait. We have seed from intersectional crosses that have the potential to revolutionize breeding in the genus. Information and background has been shared with growers and response has been extremely positive on the direction of this program.

Related Scholarship. I expect to have at least two to three releases from our current populations. Six were propagated in 2018 and growers are keenly interested. Depending on observations on inheritance of remontant flowering and ability to recover progeny from wide crosses, at least three peer-refereed publications will be generated. Ph.D. students, Jason Lattier and Hsuan Chen both conducted portions of their dissertation research on this project. The linkage map is in preparation from Dr. Lattier's work and the marker-trait association manuscript from Dr. Chen is ready for submission.

PROJECT 4. Combining red foliage and weeping habit in katsuratree.

Situation. Katsuratrees (*Cercidiphyllum japonicum*) are common landscape trees produced in large numbers in Oregon. There are several cultivars including an upright form with red foliage, 'Red Fox', and two weeping cultivars, 'Morioka Weeping' and 'Amazing Grace' that both have green foliage. However, there are no cultivars that combine red foliage and weeping habit. Our goal is to develop a red foliage cultivar with weeping habit.

Program Effort. We have nearly 300 F₁ crosses between ‘Red Fox’ x ‘Morioka Weeping’ and ‘Red Fox’ x ‘Amazing Grace’. These trees will be grown to flowering and then we will produce an F₂ population from which we expect to recover 9/16 green upright, 3/16 red upright, 3/16 green weeping, and 1/16 red weeping.

Outputs and Impacts. We have identified that both red foliage and weeping habit are recessive traits.

Related Scholarship. I expect to publish one peer-refereed publication on heritability of our traits of interest. I expect two cultivar releases, an upright red foliage form and a red foliage weeping cultivar.

PROJECT 5. Novel combinations of traits in mockorange.

Situation. There are more than 60 species of *Philadelphus*, many of which are extremely drought and/or cold tolerant and have few pest problems, which makes them desirable as low input shrubs. The majority of species are very fragrant, although a number of cultivars that are popular exhibit little to no floral fragrance. I believe there is an opportunity to develop improved cultivars beyond what are available in the market with regard to inflorescence architecture, growth habit, fragrance, and leaf quality.

Program Effort. I began this project focusing on *P. madrensis* due to its unique floral fragrance and fine leaf texture. Since 2012, we have produced many thousands of hybrids using this and approximately 10 other parents. The range of phenotypes is extremely broad and includes combinations I have not observed in commercial varieties.

Outputs and Impacts. I have determined that the characteristic “grape soda” fragrance of *P. madrensis*, as well as inflorescence architecture (multiple flowers vs. solitary) are both heritable and we have recovered progeny that exhibit both. With growers’ assistance, we have identified 11 selections from our first crosses that are promising and will be included in on-farm trials with nurseries.

Related Scholarship. I expect that over the next 10 years that this project will lead to steady cultivar releases. In addition to published cultivar releases, I expect one peer-refereed publication on heritability of ornamental traits.

b. Outreach.

As an applied plant breeder involved in cultivar development, it is imperative that I have a strong sense of growers’ needs. I am in constant contact with the industry through farm visits, field days, trade shows, trade journals, and through email updates. Many of these activities are not captured in the list below but are key to the success of my growing program.

- i. Established the Ornamental Plant Breeding Crop Advisory Committee (OPCAC) in 2017 to advise the breeding program and review proposed plant releases. The OPCAC has four university scientists and four members of the nursery industry.

- ii. Host an annual field day to share results with growers, colleagues, Master Gardeners, and the general public – 2011-current
- iii. Coordinated breeding session at 2014 Farwest show hosted by the Oregon Association of Nurseries.
- iv. Moderated session at the 2013 International Plant Propagators Society – Western Region meeting.
- v. Moderated breeding session at the 2013 Farwest show hosted by the Oregon Association of Nurseries.
- vi. Coordinated breeding session at 2012 Farwest show hosted by the Oregon Association of Nurseries.
- vii. Organized 2012 OSU column, "Growing Knowledge" that is published in the monthly magazine, *Digger*, by the Oregon Association of Nurseries.
- viii. Coordinated and staffed OSU booth at 2011 Farwest show hosted by the Oregon Association of Nurseries.

c. Collaborative Research

My program conducts collaborative research with members of the Oregon State University faculty within and beyond the Department of Horticulture, as well as with USDA scientists and other university researchers from across the country. Below is a summary of collaborators, their affiliation and the projects in which they are involved.

i. OSU

- Kelly Vining, Department of Horticulture: Characterizing mint germplasm for ploidy, genetic diversity, and oil composition.
- Kelly Vining, Department of Horticulture: Developing a linkage map and useful markers for lilac breeding.
- Lloyd Nackley, Department of Horticulture: Evaluating production capabilities of 3 new cultivars of cotoneaster from Oregon State University.
- John Lambrinos, Department of Horticulture: Population dynamics of butterfly bush cultivars.
- Gail Langellotto, Department of Horticulture: Attractiveness and resource quality of sterile butterfly bush to pollinators
- Todd Einhorn, Department of Horticulture: Investigating the presence of endoreduplication in cherry fruit during ripening
- Virginia Stockwell, Department of Botany and Plant Pathology: Screening *Cotoneaster* spp. for resistance to fire blight using varied methods.

ii. University Collaborators - National

- Loren Oki, UC-Davis: Landscape evaluation of *Cotoneaster* selections: assessing the impact of deficit irrigation on quality and resistance to locally isolated fire blight races.
 - Jim Owen, Virginia Tech
 - Screening *Cotoneaster* spp. for resistance to fire blight.
 - Evaluating production capabilities of 3 new cultivars of cotoneaster from Oregon State University.
 - Evaluation of *Pennisetum* hybrids for the Pacific Northwest
 - Pigments and performance of Japanese cedars grown in southern Georgia
- Jason Griffin, Kansas State University

- Evaluating production capabilities of 3 new cultivars of cotoneaster form Oregon State University.
 - Brian Schwartz, University of Georgia: Developing polyploidy forms of centipedegrass, seashore paspalum, and zoyiagrass
 - Wayne Hanna, University of Georgia: Evaluation of *Pennisetum* hybrids for the Pacific Northwest
- iii. USDA-ARS
- Tim Rinehart: Developing tetraploid *Hydrangea macrophylla* cultivars
- iv. Botanical Gardens and Arboreta
- Martin Nicholson, Curator Hoyt Arboretum: Landscape evaluation of *Cotoneaster* at the Hoyt Arboretum
 - Ron Determann, Atlanta Botanical Garden: Screening ornamental cultivars of japanese-cedar for polyploidy
- v. Oregon Department of Agriculture, Development of ODA *Buddleia* Regulation.
- Collaborated with Oregon Department of Agriculture to amend ODA 603-052-1200. The Noxious Weeds Quarantine included all *Buddleia davidii* and *B. varabilis* cultivars and forms; however, cultivars have been developed that do not represent an environmental threat to Oregon due to reduced fertility. Served as an advisor in developing language that outlines requirements of plants that wish to be introduced and data necessary to support claims of reduced fertility/sterility.
- vi. Oregon Department of Agriculture, Evaluation of *Buddleia* cultivars for invasiveness
- My role has been to evaluate the scientific merit of applications submitted to ODA under the amendment to ODA 603-052-1200 and provide reports with my suggestion to accept or reject the cultivar under consideration. This collaboration was undertaken because Oregon growers have expressed a great desire to continue growing *Buddleia* selections due to their economic value and demand from consumers. To date, my work with ODA has resulted in 14 cultivars being deregulated and available for Oregon growers to produce and market. The impact of this work is substantial; there are two nurseries that have been introducing cultivars under this exemption, Ball Horticulture and Spring Meadows Nursery (under the Proven Winners brand). I am not certain what the value of the Ball Horticulture cutlivars is in Oregon; however, the seven Proven Winners cultivars were estimated to be approximately \$150,000 in 2012 and \$250,000 in 2013. These were early estimates and I expect the current value to be substantially higher.
- vii. Industry
- The nursery industry has been extremely supportive of my program through providing on-farm trials of plants we are developing or have developed. Nurseries listed below have all trialed plants for my program in addition to the other activities listed with several nurseries.
- Briggs Nursery
 - Eshraghi Nursery
 - JRT Nursery
 - Van Belle Nursery
 - Bailey Nurseries Inc.
 - Blue Heron Farms
 - Monrovia Nursery
 - Heritage Seedlings
 - Carlton Plants
 - Blooming Nursery
 - J. Frank Schmidt and Sons
 - PDSI/Flowerwood
 - PLANTIPP/Concept Plants
 - Alpha Nursery

- Silver Falls
- Peoria Gardens
- Van Essen Nursery
- Plant Haven
- Terra Nova
- River Rock Nursery
- Kraemer Nursery

C. SCHOLARSHIP AND CREATIVE ACTIVITY –

1. Publication Summary

<u>Stage of publication</u>	<u>Refereed</u>	<u>Proceedings</u>	<u>Other</u>
Published	28	12	15
Accepted	2	2	
Submitted	2		

a. **Refereed Papers** (*reviewed by peers prior to publication with the option of rejection*)

I have published 30 peer-refereed journal articles, 14 research proceedings, and 14 popular press articles since 2009. I publish in journals that allow the greatest readership by my peers including HortScience, Journal of the American Society for Horticultural Science, and HortTechnology. These journals are published by the American Society for Horticultural Science and are the appropriate site for the research described in my position description. The value of my work by peers is best exhibited by my national recognition in leadership positions listed under Service (e.g. Chair of the Ornamental Plant Breeding Interest Group of ASHS, Chair of the Nursery Interest Group of ASHS, Chair of the Woody Landscape Plant Crop Germplasm Committee) as well as presenting invited international presentations (e.g. XIII Fire Blight Congress in Zurich, Switzerland, 2013; III International Symposium on Woody Ornamentals of the Temperate Zone, 2016; Korean Society for Horticultural Science). I publish more fundamental findings in alternative journals that are more appropriate such as Genome. In addition to published and accepted manuscripts, I have several more in preparation.

Note: Students I advised who served as lead author denoted with *.

1. *Chen, H., J.D. Lattier, K.J. Vining, **R.N. Contreras**. 201X. Two SNP markers identified using GBS are associated with remontancy in a segregating F1 population of *Syringa meyeri* ‘Palibin’ x *S. pubescens* ‘Penda’ Bloomerang®. J. Amer. Soc. Hort. Sci. (Submitted).
2. Hoskins, T. and **R.N. Contreras**. 201X. Increasing rates of ethylmethane sulfonate reduced seed germination percent, occurrence of twin seedlings, and plant height of *Sarcococca confusa*. HortScience (Submitted).
Role: Conceived research concept, applied treatments, directed data collection and interpretation, co-authored manuscript.
3. Petter, J., P. Ries, A. D’Antonio, and **R.N. Contreras**. 2019. How are managers making tree species selection decisions in the Pacific Northwest of the United States? Arboriculture & Urban Forestry. (Accepted).

4. *Lattier, J.D., H. Chen, and **R.N. Contreras**. 2019. Variation in genome size, ploidy, stomata, and rDNA signals in althea (*Hibiscus syriacus* L.). *J. Amer. Soc. Hort. Sci.* 144(2):130-140.
Role: Conceived research concept. Edited manuscript.
5. Graebner, R.C., H. Chen, **R.N. Contreras**, K.G. Haynes, and V.R. Sathuvalli. 2019. Identification of a high frequency of triploid potatoes from tetraploid x diploid crosses. *HortScience* (Accepted).
Role: Supported flow cytometry and cytology data collection and interpretation.
6. Vining, K.J., I. Pandelova, K. Hummer, N. Bassil, **R.N. Contreras**, K. Neill, H. Chen, A.N. Parrish, and B.M. Lange. 2019. Genetic diversity survey of *Mentha aquatica* L. and *Mentha suaveolens* Ehrh., mint crop ancestors. *Genetic Resources and Crop Evolution* 66(4):825-845.
Role: Supported flow cytometry and cytology data collection and interpretation.
7. *Chen, H., L. Xue, T. Li, and **R.N. Contreras**. 2019. Quantile regression facilitates simultaneous selection of negatively correlated floral traits among BC₁F₁ progeny of the male fertile hybrid cultivars Lohengrin and Resi (*Hibiscus syriacus* x *H. paramutabilis*). *J. Amer. Soc. Hort. Sci.* 144(1):70-76.
Role: Conceived research project, compiled germplasm, guided population development, and heavily edited manuscript.
8. **Contreras, R.N.** and K. Shearer. 2018. Genome size, ploidy, and base composition of wild and cultivated maples. *J. Amer. Soc. Hort. Sci.* 143(6):470-485.
<https://doi.org/10.21273/JASHS04541-18>
Role: Conceived research concept, oversaw data collection, interpretation, and presentation. Prepared much of discussion.
9. *Lattier, J.D. and **R.N. Contreras**. 2017. Ploidy and genome size in lilac species, cultivars, and interploid hybrids. *J. Amer. Soc. Hort. Sci.* 142(5):355–366. doi: 10.21273/JASHS04189-17
Role: Conceived research concept, compiled initial germplasm collection, guided research, and edited manuscript.
10. *Lattier, J.D. and **R.N. Contreras**. 2017. Intraspecific, interspecific, and interseries cross-compatibility in lilac. *J. Amer. Soc. Hort. Sci.* 142(4):279-288. (JASHS cover).
Role: Conceived research concept, compiled initial germplasm collection, guided research, and edited manuscript.
11. *Lattier, J.D., H. Chen, and **R.N. Contreras**. 2017. Improved method for enzyme digestion of root tips for cytology. *HortScience* 52(7):1029-1032.
Role: Collaborated on developing research concept, provided range of germplasm on which to evaluate the protocol, reviewed findings, edited manuscript.
12. *Schulze, J.A., J.D. Lattier, and **R.N. Contreras**. 2017. In vitro germination of immature *Prunus lusitanica* seed. *HortScience* 52(8):1122-1124.
Role: Conceived research concept, directed research, and assisted in data interpretation. Edited manuscript.
13. *Schulze, J.A. and **R.N. Contreras**. 2017. In vivo chromosome doubling of *Prunus lusitanica* and preliminary morphological observations. *HortScience*. 52(3):332-337.
Role: Conceived research concept, directed research, and assisted in data interpretation. Edited manuscript.

14. *Schulze, J.A., **R.N. Contreras**, and C.F. Scagel. 2017. Comparing vegetative propagation of two 'Schipkaensis' cherry laurel ploidy levels. *HortTechnology* 27(1):69-72.
Role. Experimental design, assisted in data interpretation, and edited manuscript.
15. **Contreras, R.N.** and L. Meneghelli. 2016. In vitro chromosome doubling of *Prunus laurocerasus* 'Otto Luyken' and 'Schipkaensis'. *HortScience* 51(12):1463-1466.
Role. Research concept, data analysis, authored manuscript.
16. *Rothleitner, J.J., M.W. Friddle, and **R.N. Contreras**. 2016. Ploidy levels, relative genome sizes, and base pair composition in *Cotoneaster*. *J. Amer. Soc. Hort. Sci.* 141(5):457-466.
Role. Research concept, directed research, data analysis, and co-authored manuscript including preparation of tables.

PRIOR TO PROMOTION

17. **Contreras, R.N.** and M.W. Friddle. 2015. 'Oregon Snowflake' flowering currant. *HortScience* 50(2):320-321.
Role. Conceived breeding project, made treatments, oversaw selection, propagation, and testing of this release. Authored manuscript.
18. *Rothleitner, J.J., **R.N. Contreras**, V.O. Stockwell, and J.S. Owen, Jr. 2014. Screening *Cotoneaster* for resistance to fire blight by artificial inoculation. *HortScience* 49(12):1480-1485.
Role. Advised graduate student and conceived research concept, edited manuscript.
19. **Contreras, R.N.**, J.M. Ruter, and D.A. Knauff. 2014. Flower, fruit, and petiole color of american beautyberry (*Callicarpa americana* L.) are controlled by a single gene with three alleles. *HortScience* 49(4):422-424. (*HortScience* cover)
Role. Designed and conducted experiments, authored manuscript.
20. **Contreras, R.N.**, J.M. Ruter, J.S. Owen, Jr., A. Heogh. 2013. Chlorophyll, carotenoid, and visual color rating of japanese-cedar grown in the southeastern United States. *HortScience* 48(12):1452-1456.
Role. Designed and conducted experiments, authored manuscript.
21. Schwartz, B.M., **R.N. Contreras**, K.R. Harris-Schultz, D.L. Heckart, J.B. Peake, and P.L. Raymer. 2013. Discovery and characterization of a turf-type triploid seashore paspalum. *HortScience* 48(12):1424-1427.
Role. Performed genome sizing and cytology data collection and analysis. Assisted with manuscript revision.
22. Schwartz, B.M., K.R. Harris-Schultz, **R.N. Contreras**, C.S. Hans, W.W. Hanna, and S.R. Milla-Lewis. 2013. Creation of artificial triploid and tetraploid centipede grass using colchicine and breeding. *Intl. Turfgrass Soc. Res. J.* 12:327-334.
Role. Assisted with experimental design and implementation.
23. **Contreras, R.N.**, J.S. Owen, W.W. Hanna, and B.M. Schwartz. 2013. Evaluation of seven complex *Pennisetum* spp. hybrids for container and landscape performance in the Pacific Northwest. *HortTechnology* 23(4):525-528.
Role. Developed concept, authored manuscript, and jointly oversaw experiments with co-authors.

24. Schwartz, B.M., K.R. Harris-Schultz, C.S. Hans, **R.N. Contreras**, and S.A. Jackson. 2013. Creation of hexaploid and octoploid zoysiagrass using colchicine and breeding. *Crop Science* 53:2218-2224.
Role. Assisted with experimental design and implementation; edited manuscript.
25. Landgren, C., J.S. Owen, and **R.N. Contreras**. 2013. Evaluating soil and foliar fertilization of *Abies nordmanniana* under container and field production. *Scandinavian J. For. Res.* Published online 7 Jan 2013. doi:10.1080/02827581.2012.762939
Role. Performed chlorophyll analysis and assisted with manuscript preparation and revision.
26. **Contreras, R.N.**, R. Golembiewski, J. Velez. 2013. Evaluation of study habits of plant identification students. *HortTechnology* 23(1):130-133.
Role. Developed research concept and co-authored manuscript, co-authors developed survey instrument, analyzed data, and co-authored manuscript
27. Vining, K.J., **R.N. Contreras**, M. Ranik, and S.H. Strauss. 2012. Genetic methods for mitigating invasiveness of woody ornamental plants: research needs and opportunities. *HortScience* 47(9):1210-1216.
Role. Authored section on traditional plant breeding techniques for sterility in ornamentals; edited manuscript.
28. **Contreras, R.N.** 2012. A simple chromosome doubling technique is effective in several species of Cupressaceae. *HortScience* 47(6):712-714.
Role. Authored paper, conducted experiments, and analyzed data.
29. **Contreras, R.N.**, J.M. Ruter, J. Conner, Y. Zeng, and P. Ozias-Akins. 2012. Interspecific hybridization in *Tecoma* Juss. (Bignoniaceae): Confirmation of hybridity using GISH and determination of 18s rDNA copy number using FISH in F₁ hybrids. *Genome* 55(6):437-445. doi: 10.1139/g2012-030
Role. Authored paper, co-authors assisted with laboratory experiments and techniques, data collection, interpretation, and manuscript preparation.
30. **Contreras, R.N.**, R. Determann, and M. Friddle. 2011. Differences in winter browning among japanese-cedar cultivars are not due to variation in ploidy levels. *HortScience* 46(11):1465-1467.
Role. Authored paper, co-authors assisted with data collection and interpretation (Friddle) and background of the project (Determann).
31. **Contreras, R.N.** and J.M. Ruter. 2011. Genome size estimates and chromosome numbers of *Callicarpa* L. (Lamiaceae). *HortScience* 46(4):567-570.
Role. Authored paper, co-author assisted with research concept and manuscript preparation.
32. **Contreras, R.N.**, J.M. Ruter, and B.M. Schwartz. 2010. Oryzalin-induced tetraploidy in *Cryptomeria japonica* (Cupressaceae). *HortScience* 45(2):316-319.
Role. Authored paper, co-authors assisted with research concept, data collection and interpretation, and manuscript preparation.
33. **Contreras, R.N.**, J.M. Ruter, and W.W. Hanna. 2009. An oryzalin-induced autoallooctoploid of *Hibiscus acetosella* Welw. ex Hiern. 'Panama Red' (Malvaceae). *J. Amer. Soc. Hort. Sci.* 134(5):553-559.
Role. Authored paper, co-authors assisted with research concept and manuscript preparation.

PRIOR TO OSU

Contreras, R.N. and J.M. Ruter. 2009. Sulfuric acid scarification of *Callicarpa americana* (Lamiaceae) seeds improves germination. *Native Plants J.* 10(3):283-286.

Contreras, R.N. and T.G. Ranney. 2008. New opportunities for breeding fragrant rhododendrons. *J. Amer. Rhododendron Soc.* 62(4):201-202.

Contreras, R.N., T.G. Ranney, and S.P. Tallury. Reproductive behavior of diploid and allotetraploid *Rhododendron* L. 'Fragrant Affinity'. 2007. *HortScience* 42(1):31-34.

Contreras, R.N., T.G. Ranney, S.R. Milla-Lewis, and G.C. Yench. 2007. Investigating parentage and hybridity of three azaleodendrons using AFLP analysis. *HortScience* 42(3):740-743.

b. Proceedings (reviewed by peers prior to publication without the option of rejection)

Note: students I advised who served as lead author denoted with *.

1. Giffei, B.L., R.N. Contreras, V.O. Stockwell, J.A. Sisneroz, S.K. Reid, and L.R. Oki. 201X. Assessing fire blight resistance of new *Cotoneaster* genotypes inoculated with *Erwinia amylovora* in the field. *Acta Hort.* (Accepted).

Role

2. **Contreras, R.N.**, H. Chen, J.D. Lattier, and K. Vining. 2019. Two SNPs identified using GBS are associated with reblooming in dwarf lilacs. *Proc. 63th Ann. SNA Res. Conf.* (Accepted)

Role

3. **Contreras, R.N.** 2018. Breeding for form and fire blight resistance in *Cotoneaster*. *Proceedings of the III International Symposium of Woody Ornamentals of the Temperate Zone.* *Acta Hort.* 1191: 83-88.

Role

4. **Contreras, R.N.** 2017. The struggle is real (but fun!): Long term plant breeding at a public university. *67th Combined Proceedings of the International Plant Propagators' Society.* *Acta Hort.* 1212:223-224.

Role

5. *Lattier, K.S. and **R.N. Contreras.** 2015. Non-targeted mutagenesis of *Ornithogalum candidans* through exposure to ethyl methanesulfonate. *65th Combined Proceedings of the International Plant Propagators' Society.* *Acta Hort.* 1140:195-196.

Role

6. *Schulze, J. and **R.N. Contreras.** 2015. Effect of ploidy level on vegetative propagation of two cytotypes of *Prunus laurocerasus* L. 'Schipkaensis'. *65th Combined Proceedings of the International Plant Propagators' Society.* *Acta Hort.* 1140:199-200.

Role

7. *Lattier, K.S. and **R.N. Contreras.** 2015. Chemical mutagenesis of *Galtonia candidans* Decne. results in altered morphology and reduced fertility. *Proc. 60th Ann. SNA Res. Conf.* 60:209-215.

- Role.* Developed research concept, directed student on breeding aspects of project, and advised student performing experiments. Edited manuscript
8. **Contreras, R.N.** and M.W. Friddle. 2015. Fire blight resistance among interspecific and interploidy F1 hybrids of *Cotoneaster*. Proc. 60th Ann. SNA Res. Conf. 60:186-190.
Role. Developed research concept, compiled germplasm, directed controlled crosses, made selections, and directed data collection. Authored manuscript.
 9. **Contreras, R.N.**, A. Haddad, K.S. Latier, and J.D. Lattier. 2015. Genome sizes and ploidy levels of maples: sample handling and preliminary estimates. Proc. 60th Ann. SNA Res. Conf. 60:191-199.
Role. Developed research concept, helped compile germplasm, and directed undergraduate student. Authored manuscript.
 10. *Lattier, J.D. and **R.N. Contreras**. 2014. Interspecific hybridization in lilacs. Proc. 59th Ann. SNA Res. Conf. 59:229-234.
Role. Developed research concept, compiled germplasm, and directed graduate student. Edited manuscript.
 11. **Contreras, R.N.**, J. Rothleitner, and V. Stockwell. 2014. Breeding for fire blight resistance and sterility in *Cotoneaster*. Proceedings of the 13th International Workshop on Fire Blight. ActaHort. 1056:221-223.
Role. Developed research concept, directed student on breeding aspects of project, and advised student performing experiments. Authored manuscript.
 12. **Contreras, R.N.** 2013. Ornamental Plant Breeding at Oregon State University. 63rd Combined Proceedings of the International Plant Propagators' Society. Acta Hort. 1055:159-162.
 13. **Contreras, R.N.**, M. Friddle, and J.D. Lattier. 2013. Relative fertility and ploidy levels of selected rose of sharon cultivars. Proc. 58th Ann. SNA Res. Conf. 58:232-236.
Role. Developed research concept, designed experiment, analyzed data, and authored manuscript.
 14. *Rothleitner, J.J., **R.N. Contreras**, and V. Stockwell. 2012. Evaluation of fire blight resistance of 31 species of *Cotoneaster*. Proc. 57th Ann. SNA Res. Conf. 57:276-278.
Role. Developed research concept and advised preparation of manuscript. Co-author Rothleitner prepared manuscript and conducted research. Co-author Stockwell established protocols for experiments and data collection.
 15. **Contreras, R.N.** and J.M. Ruter. 2010. Induced polyploidy in Japanese cedar. Proc. 55th Ann. SNA Res. Conf. 55:25-29.
Role. Authored paper, co-author assisted with research concept, data interpretation and manuscript preparation.

PRIOR TO OSU

Contreras, R.N. and J.M. Ruter. 2008. Preliminary efforts to induce polyploidy in *Cryptomeria japonica*. Proc. 53rd Ann. SNA Res. Conf. 53:159-161.

Contreras, R.N. and J.M. Ruter. 2007. New *Callicarpa* species with breeding potential. Proc. 52nd Ann. SNA Res. Conf. 52:327-329.

Contreras, R.N., T.G. Ranney, S.P. Tallury and S.R. Milla. 2005. Using molecular markers to investigate parentage of azaleodendron hybrids. 2005. Proc. 50th Ann. SNA Res. Conf. 50:632-635.

Contreras, R.N. and T.G. Ranney. 2004. New opportunities for breeding allopolyploid azaleodendrons. Proc. 49th Ann. SNA Res. Conf. 49:552-554.

c) Industry or popular press

Note: Students I advised who served as lead author denoted with *.

1. **Contreras, R.N.** 2019. Get 'em while they're hot: New cultivars from OSU. *Digger*, August: 101-104.
2. **Contreras, R.N.** 2017. A focus on function. *Digger*, June:33-36.
3. *Lattier, J.D. and **R.N. Contreras**. 2016. A tale of two lilacs: Part I – *Syringa*. *Digger*, January:33-36.
4. *Lattier, J.D. and **R.N. Contreras**. 2016. A tale of two lilacs: Part II – *Pubescentes*. *Digger*, June:33-36.
5. **R.N. Contreras**. 2016. Reigning in rogues. *Digger*, August:45-50.
6. *Lattier, K.S. and **R.N. Contreras**. 2015. Penstemon breeding in the Willamette Valley: A lesson in flexibility. *Bulletin of the American Penstemon Society* 74:35-41.
7. **Contreras, R.N.** and J.D. Lattier. 2014. Improving a garden classic. *Digger*, August:47-50.
8. **Contreras, R.N.** and M. Horn. 2014. Breeding to improve garden performance of *Penstemon* in the Willamette Valley: early stages. *Bulletin of the American Penstemon Society* 73:68-72.
9. **Contreras, R.N.** and G. McAninch. 2013. Back from the ban: new *Buddleja* cultivars receive exemption under ODA amendment. *Digger*, October:33-36.
10. **Contreras, R.N.** and T. Rinehart. 2012. Technology for the future. *Digger*, August:47-50.
11. *Rothleitner, J.J. and **R.N. Contreras**. 2012. Celebrating Cotoneaster. *Digger*, January:33-36.
12. **Contreras, R.N.** and J.S. Owen. 2011. The Economy of Water. *Digger*, August:139-144.
13. **Contreras, R.N.** 2011. Bred for success: The Nursery Crop Breeding Program at Oregon State University is developing the next generation of nursery and landscape plants for growers in Oregon and beyond. *Digger* March:41-45.
14. **Contreras, R.N.** 2010. Bridging the gap: A new partnership between Oregon State University and LPDC designed to continue cultivar development. *Landscape Plant News* 21(1):6-7.
15. **Contreras, R.N.** and J.M. Ruter. 2010. Developing an evergreen evergreen: Winter browning in Japanese cedar. *Amer. Conifer Soc. Quarterly J.* 27(1):19-23.

PRIOR TO OSU

Contreras, R.N. and J.M. Ruter. 2009. *Callicarpa* evaluation and breeding at The University of Georgia Tifton Campus. *Landscape Plant News* 20(2):3-5.

Contreras, R.N. and J.M. Ruter. 2008. Evaluation of *Callicarpa* spp. for utilization in a breeding program. Georgia Green Industry Association Journal. May/June 32-33.

Contreras, R.N., T. Ranney, T. Eaker, J. Mowrey, and N. Lynch. 2005. Fragrant rhododendrons for southern gardens: Current breeding efforts at NCSU. Proc. N.C. Nursery Short Course 6: 7

d) Book Chapters

1. Van Laere, K., S.C. Hokanson, **R.N. Contreras**, and J. Van Huylenbroeck. 2018. Woody ornamentals of the temperate zone, p. 803-886. In: J. Van Huylenbroeck (ed.). Ornamental Crops. Handbook of Plant Breeding, vol. 11. Springer, Cham, Switzerland.

2. Presentation to peers

a. Posters: I have been an author on 17 posters since beginning my appointment at OSU.

Note: Students I advised who served as lead author denoted with *.

1. *Neill, K. and **R.N. Contreras**. 2019. Vaccinium fruit. ASHS.
2. Vining, K.J., I. Pandelova, K. Hummer, N. Bassil, **R.N. Contreras**, K. Neill, H. Chen, A.N. Parrish, B.M. Lange. 2019. Genetic diversity survey of two mint crop ancestral species: *Mentha aquatica* L. and *Mentha suaveolens* Ehrh. Annual Plant and Animal Genome Conference. San Diego, CA.
3. *Chen, H., J.D. Lattier, and **R.N. Contreras**. 2018. Confirmation of *Hibiscus syriacus* allotetraploid genome and disomic segregation pattern using rDNA fluorescent in situ hybridization. HortScience Accepted (Abstr.)
4. *Lattier, J.D. and **R.N. Contreras**. 2016. Cross compatibility studies in lilac (*Syringa* L.). Independent Plant Breeders Conference. Morton Arboretum, Chicago, IL.
5. *Chen, H. and **R.N. Contreras**. 2016. Using interspecies hybrids as pollen parents in *Hibiscus syriacus* breeding. IPBC. Independent Plant Breeders Conference. Morton Arboretum, Chicago, IL.
6. *Lattier, J.D. and **R.N. Contreras**. 2016. Cross compatibility studies in lilac (*Syringa* L.). HortScience 51(9):S301-302 (Abstr.)

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7. *Lattier, J.D. and **R.N. Contreras**. 2014. Colorimetric phenotyping of tetraploid progeny exhibiting incomplete dominance for flower color. Independent Plant Breeders Conference. Grand Rapid, MI
Role. Conceived original research concept and directed graduate student.
8. *Shearer-Lattier, K. and **R.N. Contreras**. 2014. Non-targeted mutagenesis of *Galtonia candicans* by exposing seeds to EMS. Independent Plant Breeders Conference. Grand Rapid, MI, October 30 – November 2, 2014.
Role. Conceived research concept, applied treatments, directed graduate student.
9. **Contreras, R.N.** and L. Meneghelli. 2013. In Vitro Chromosome Doubling of *Prunus laurocerasus* ‘Otto Luyken’. Proc. 110th Ann. Amer. Soc. Hort. Sci. Res. Conf. HortScience 48(9):S411 (Abstr.)

- Role.* Developed research concept, designed experiments, analyzed data, authored abstract, and prepared poster.
10. Schwartz, B.M., **R.N. Contreras**, W.W. Hanna, and S.A. Jackson. 2013. Manipulating the Chromosome Number of Zoysiagrass. ASA-CSSA-SSSA Abstracts 2013. (Abstr.)
Role. Assisted with experimental design and treatment application protocol, assisted in writing abstract.
 11. Schwartz, B.M., **R.N. Contreras**, K.R. Harris-Schultz, J.B. Peake, and P.L. Raymer. 2012. Identification or Creation of a Putative Triploid Seashore Paspalum. ASA-CSSA-SSSA Abstracts 2012. (Abstr.)
Role. Assisted with experimental design and treatment application protocol, assisted in writing abstract.
 12. *Rothleitner, J.J. and **R.N. Contreras**. 2012. Variable Fire Blight Resistance Among 31 species of *Cotoneaster*. Proc. 109th Ann. Amer. Soc. Hort. Sci. Res. Conf. HortScience 47(9):S366 (Abstr.)
Role. Project concept, prepared poster, and assisted writing abstract.
 13. Einhorn, T., Gibeaut, D., **Contreras, R.N.**, and Whiting, M. 2012. Polyploidy of cells in sweet cherry fruit. Proc. 109th Ann. Amer. Soc. Hort. Sci. Res. Conf. HortScience 47(9):S387 (Abstr.)
Role. Data collection and interpretation.
 14. Gibeaut, D., **R. Contreras**, T. Einhorn, and M. Whiting. 2011. Cropload affects the size, but not the number or polyploidy of cells in sweet cherry fruit. Washington State Horticultural Association 107th Annual Meeting, Wenatchee, WA, December 5-7, 2011.
Role. Data collection and interpretation.
 15. **Contreras, R.N.**, J.M. Ruter, J. Conner, Y. Zeng, and P. Ozias-Akins. 2011. Interspecific hybridization in *Tecoma* Juss. (Bignoniaceae): Confirmation of hybridity using GISH and morphology. Proc. 108th Ann. Amer. Soc. Hort. Sci. Res. Conf. HortScience 46(9):S320. (Abstr.)
Role. Experimental design, conducted research, and authored abstract. Co-authors assisted with various stages of experimental design, execution, and interpretation of data.
 16. *Rothleitner, J.J. and **R.N. Contreras**. 2011. Genome size estimates for *Cotoneaster* spp. Proc. 108th Ann. Amer. Soc. Hort. Sci. Res. Conf. HortScience 46(9):S386 (Abstr.)
Role. Experimental design, advised on instrument operation and collection of data, assisted in writing abstract.
 17. Schwartz, B., K. Harris, **R. Contreras**, and W. Hanna. 2010. Colchicine-Induced Tetraploidy in Centipedegrass. ASA-CSSA-SSSA Abstracts 2010. (Abstr.)
Role. Assisted with experimental design and treatment application protocol, assisted in writing abstract.
 18. **Contreras, R.N.** and John M. Ruter. 2010. Fruit color in American beautyberry is controlled by a single gene. Proc. 107th Ann. Amer. Soc. Hort. Sci. Res. Conf. HortScience 45(8):S280 (Abstr.)
Role. Abstract author; co-author assisted with data interpretation and poster preparation.

PRIOR TO OSU

Contreras, R.N. and J.M. Ruter. 2009. An oryzalin induced polyploidy from a hybrid of *Hibiscus acetosella* x *H. radiatus* (Malvaceae) exhibits reduced fertility and altered morphology. Proc. 106th Ann. Amer. Soc. Hort. Sci. Res. Conf. HortScience 44(4):1177. (Abstr.).

Contreras, R.N. and J.M. Ruter. 2008. Evaluation of *Callicarpa* spp. for ornamental potential. Proc. 105th Ann. Amer. Soc. Hort. Sci. Res. Conf. HortScience 43(4):1266. (Abstr.).

Contreras, R.N. and T.G. Ranney. 2006. Reproductive Behavior of Diploid and Allotetraploid Azaleodendrons. HortScience 40(3):497-498. (Abstr.).

b) Oral Presentations: I have made 19 oral presentations to peers and sat on 1 peer panel discussion since starting my appointment at OSU including 5 invited presentations nationally and 2 invited presentation internationally.

1. **R.N. Contreras** and J.D. Lattier. 2019. Fertility of althea cultivars. ASHS
2. **R.N. Contreras**, H. Chen, J.D. Lattier, and K. Vining. 2019. Two SNPs identified using GBS are associated with reblooming in dwarf lilacs. 63th Ann. SNA Res. Conf.
3. *Lattier, J.D., and **R.N. Contreras**. 2018. Segregation of floral traits in althea (*Hibiscus syriacus* L.). HortScience Accepted (Abstr.)
4. **Contreras, R.N.** 2017. Developing triploid maples. Amer. Soc. Hort. Sci. Annual Meeting. Amer. Soc. Hort. Sci. Ann. Conf. Kailua-Kona, HI.
5. **Contreras, R.N.** 2016. Breeding cotoneasters for improved form and fire blight resistance. III International Symposium on Woody Ornamentals of the Temperate Zone. Minneapolis, MN.

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6. **Contreras, R.N.** 2015. Reducing fertility in maples: hybridization, polyploidization, and natural ploidy variation in *Acer*. University of Minnesota, Department of Horticulture – Departmental Seminar February 25. **Invited Speaker**
7. **Contreras, R.N.** 2015. Adventures in plant breeding from the Deep South to the 45th Parallel. Friends of the J.C. Raulston Arboretum Lecture. Raleigh, NC. **Invited Speaker.**
8. **Contreras, R.N.** 2014. Interspecific hybridization in lilacs. 59th Ann. SNA Res. Conf.
9. **Contreras, R.N.** 2013. Ornamental plant breeding at Oregon State University. International Plant Propagators Society – Western Region and International Annual Meeting, Portland, OR. **Invited Speaker**
10. **Contreras, R.N.** 2013. Taking advantage of natural variation in ploidy levels. American Society of Horticultural Science Annual Conference. Palm Desert, CA. **Invited Speaker**

11. **Contreras, R.N.**, J. Rothleutner, and V. Stockwell. 2013. Breeding for fire blight resistance and sterility in *Cotoneaster*. 13th ISHS International Fire Blight Workshop. Zürich, Switzerland. ***International Invited and Funded Speaker***
12. **Contreras, R.N.**, M. Friddle, and J.D. Lattier (presented). 2013. Relative fertility and ploidy levels of selected rose of sharon cultivars. 58th Ann. SNA Res. Conf.
13. **Contreras, R.N.** 2012. Twice Is Nice: The Role of Polyploidy in Ornamental Plant Breeding. Independent Plant Breeders Conference. Portland, OR. ***Invited Speaker***
14. **Contreras, R.N.** 2012. Invasive Plant Council of British Columbia. Horticultural Tools for Preventing Invasive Species. Vancouver, B.C., Canada. ***International Invited and Funded Speaker***
15. **R.N. Contreras.** 2012. Evaluation of fire blight resistance of 31 species of *Cotoneaster*. 57th Ann. SNA Res. Conf. 57:276-278.
16. **Contreras, R.N.** 2010. Workshop: The Role of Horticulture in Controlling Invasive Species. American Society of Horticultural Science Annual Conference. Palm Desert, CA. ***Invited Panel Member***
17. **Contreras, R.N.** 2010. Workshop: Life After Graduation. American Society of Horticultural Science Annual Conference. Palm Desert, CA. ***Invited Speaker***
18. **Contreras, R.N.** 2010. Breeding methods to reduce the invasive potential of nursery crops. American Society of Horticultural Science Annual Conference. Palm Desert, CA. ***Invited Speaker***
19. **Contreras, R.N.** 2010. Induced polyploidy in Japanese cedar. 55th Ann. SNA Res. Conf.
20. **Contreras, R.N.** 2010. Ornamental Plant Breeding at Oregon State University. Departmental Seminar, Department of Horticulture, Oregon State University.

c. Workshops and tours

Contreras, R.N. 2017. Nursery and Garden Tours on the Big Island of Hawaii. American Society of Horticultural Science Annual Conference. Kailua-Kona, HI. ***Coordinator on behalf of Nursery Working Group***

Contreras, R.N. and W. Dai. 2013. The Role and Importance of Polyploidy in Ornamental Plant Breeding. American Society of Horticultural Science Annual Conference. Palm Desert, CA. ***Coordinator***

Contreras, R.N. and J. Altland. 2012. Invasive Plants: Breeding, Production, Ecology, and Management. American Society of Horticultural Science Annual Conference. Miami, FL. ***Coordinator***

3. Grant and Contract Support Summary: I have generated \$1,876,395 in extramural support since 2009, of which \$1,037,266 came to my program.

<u>Organization</u>	<u>Funded</u>	<u>Received by my program</u>
<i>Grants</i>		
USDA-SCRI	50,000	0
USDA-ARS-Northwest Nursery Res. Cntr.	48,000	48,000
Horticultural Research Institute	35,442	

USDA-NIFA		
American Rhododendron Society	1,000	1,000
USDA-ARS-U.S. National Arboretum	12,658	12,658
American Penstemon Society	1,713	1,713
Agriculture Research Foundation	36,117	30,617
Oregon Department of Agriculture	496,051	496,051
Schmidt Family Charitable Foundation	106,875	106,875
California Dept. Food and Agriculture	309,348	14,240
Center for Applied Nursery Research	2,500	2,500
Subtotal	1,099,704	654,921
Fees/Donations		
JLPN Liners	500	500
Bailey Nurseries	1,500	1,500
Heritage Seedlings	3,250	3,250
Fall Creek Nursery	3,500	3,500
Oregon Department of Agriculture	2,050	2,050
Univ. of Georgia Turfgrass Program	5,000	5,000
Online Courses	670,391	276,045
Subtotal	686,191	291,845
Contracts		
Landscape Plant Development Center (LPDC)	90,500	90,500
Total	1,876,395	1,037,266

**a. Funded
Competitive**

Contreras, R.N., G. Langellotto, J. Lambrinos. 2019. Fertility, population dynamics, and pollinator attractiveness of standard and “sterile” cultivars of *Buddleia*. Horticultural Research Institute - \$35,442.

Contreras, R.N. 2019. Evaluating a diverse germplasm collection of maples for breeding and introduction. J. Frank Schmidt Family Charitable Foundation - \$5,000.

Contreras, R.N. 2019. Continued efforts to develop and evaluate sterile triploid maples. J. Frank Schmidt Family Charitable Foundation - \$10,000.

Contreras, R.N. 2019. Developing sterile forms of economically important nursery crops. Oregon Department of Agriculture - \$28,732.

Contreras, R.N. 2019. Developing novel, disease resistant forms of nursery crops. Oregon Department of Agriculture - \$30,001.

Contreras, R.N. 2018. Infrastructure for development and evaluation of shade trees. J. Frank Schmidt Family Charitable Foundation - \$5,000.

Contreras, R.N. 2018. Evaluating triploid amur, norway, and trident maples. J. Frank Schmidt Family Charitable Foundation - \$10,000.

Contreras, R.N. 2018. Developing triploid forms of maples to breed for reduced invasiveness. USDA-Northwest Nursery Crop Research Center - \$24,000.

Contreras, R.N. 2018. Developing sterile forms of economically important nursery crops. Oregon Department of Agriculture - \$28,158

Contreras, R.N. 2018. Developing novel, disease resistant forms of nursery crops. Oregon Department of Agriculture - \$30,000.

Contreras, R.N. 2017. Developing tetraploid forms of maples to breed for reduced invasiveness. USDA-Northwest Nursery Crop Research Center - \$24,000.

Contreras, R.N. 2017. Developing sterile forms of economically important nursery crops. Oregon Department of Agriculture - \$23,600.

Contreras, R.N. 2017. Developing novel, disease resistant forms of nursery crops. Oregon Department of Agriculture - \$35,125.

Contreras, R.N. 2017. Induced polyploidy in three maple species to breed for sterile triploids. J. Frank Schmidt Family Charitable Foundation - \$12,000.

Oki, L., J. Sisneroz, K. Reid, **R. Contreras**, D. Haver, and D. Fujino. 2016. Landscape Plant Performance: Water Use and Disease Resistance Assessments and New Cultivar Selections. California Department of Food and Agriculture, Specialty Crop Block Grant Program - \$309,348.

Contreras, R.N. 2016. Evaluating five improved genotypes of cotoneasters for container production in southeastern U.S. Center for Applied Nursery Research - \$2,500.

Contreras, R.N. 2016. Assessing genome size in maples: an express route to improved cultivars with reduced fertility. J. Frank Schmidt Family Charitable Foundation - \$10,000.

Contreras, R.N. 2016. Induced polyploidy in three maple species to breed for sterile triploids. J. Frank Schmidt Family Charitable Foundation - \$5,000.

Contreras, R.N. 2016. Developing sterile forms of economically important nursery crops. Oregon Department of Agriculture - \$23,402.

PRIOR TO PROMOTION

- Contreras, R.N.** 2016. Developing novel, disease resistant forms of nursery crops. Oregon Department of Agriculture - \$34,260.
- Contreras, R.N.** 2015. Developing sterile forms of economically important nursery crops. Oregon Department of Agriculture - \$23,225.
- Contreras, R.N.** 2015. Developing novel, disease resistant forms of nursery crops. Oregon Department of Agriculture - \$33,610.
- Contreras, R.N.** 2015. Combining weeping and purple foliage traits in katsuratree. J. Frank Schmidt Family Charitable Foundation - \$6,000.
- Contreras, R.N.** 2015. Induced polyploidy in five maple species to breed for sterile triploids. J. Frank Schmidt Family Charitable Foundation - \$5,000.
- Contreras, R.N.** 2014. Developing garden-worthy varieties using interspecific hybridization in subgenus *Dasanthera* and subgenus *Saccanthera*, respectively. American Penstemon Society - \$750.
- Contreras, R.N., J. Perkins, S. Perkins, J. Loureiro.** 2014. Counting Chromosomes of Species in *Rhododendron* Subgenus *Rhododendron* Section *Schistanthe* (*Vireya*) Having Flow Cytometry Scores Well Above the Range Normally Expected for Diploid Species in *Rhododendron* Subgenus *Rhododendron*. - \$1,000
- Contreras, R.N.** 2014. Induced polyploidy in five maple species to breed for sterile triploids. J. Frank Schmidt Family Charitable Foundation - \$4,500.
- Contreras, R.N.** 2014. Combining weeping and purple foliage traits in katsuratree. J. Frank Schmidt Family Charitable Foundation - \$5,000.
- Contreras, R.N.** 2014. Developing sterile forms of economically important nursery crops. Oregon Department of Agriculture - \$20,000.
- Contreras, R.N.** 2014. Developing novel, disease resistant forms of nursery crops. Oregon Department of Agriculture - \$18,000.
- Contreras, R.N.** 2013. Evaluation of *Cotoneaster* spp.: Landscape performance, fireblight resistance, and ploidy levels. USDA-ARS-USNA - \$12,658
- Contreras, R.N.** 2013. Developing garden-worthy varieties using interspecific hybridization in subgenus *Dasanthera* and subgenus *Saccanthera*, respectively. American Penstemon Society - \$963.
- Contreras, R.N.** 2013. Developing sterile forms of economically important nursery crops. Oregon Department of Agriculture - \$20,000.

Contreras, R.N. 2013. Retaining an industry-wide benefit by the OSU Ornamental Plant Breeding Program. Oregon Department of Agriculture - \$10,000.

Contreras, R.N. 2013. Developing novel, disease resistant forms of nursery crops. Oregon Department of Agriculture - \$20,000.

Contreras, R.N. 2013. Induced polyploidy in five maple species to breed for sterile triploids. J. Frank Schmidt Family Charitable Foundation - \$8,000

Contreras, R.N. 2013. Combining weeping and purple foliage traits in katsuratree. J. Frank Schmidt Family Charitable Foundation - \$2,500.

Contreras, R.N. 2012. In vitro chromosome doubling of common cherry laurel and Norway maple. Agriculture Research Foundation - \$12,367.

Contreras, R.N. 2011. Induced polyploidy in six maple species to breed for sterile triploids. Oregon Department of Agriculture - \$15,868.

Contreras, R.N. 2011. Development of tetraploid norway maple cultivars. J. Frank Schmidt Charitable Foundation - \$7,500.

Contreras, R.N. 2011. Mapping the woody plants of Oregon State University. J. Frank Schmidt Charitable Foundation - \$5,000.

Contreras, R.N. 2010 – 13. Cultivar development for the LPDC. Landscape Plant Development Center - \$90,500. (Contract covering 0.25 FTE and OPE plus funds for supplies)

Pellett, H. and **R.N. Contreras.** 2010. Development of new, superior cutlivars of landscape plants. Oregon Department of Agriculture - \$30,000

Contreras, R.N., S. Doane, and M. Friddle. 2010. Development of sterile cherry laurel cultivars. Oregon Department of Agriculture - \$20,570

Contreras, R.N. 2009. Development of tetraploid norway maple cultivars. J. Frank Schmidt Charitable Foundation - \$6,375.

Contreras, R.N. and T. Rinehart. 2009. Development of tetraploid *Hydrangea macrophylla* cultivars. Oregon Department of Agriculture - \$21,500.

Contreras, R.N. 2009. Development of a sterile form of norway maple (*Acer platanoides*). Agricultural Research Foundation - \$11,250.

Non-competitive

Contreras, R.N. 2013. Ploidy manipulation of *Vaccinium arboreum* ‘Sparkleberry’. Fall Creek Nursery - \$3,500.

Contreras, R.N. 2011. RAPD screening of red maple cultivars. Bailey Nursery, Inc. - \$1,000.

Contreras, R.N. 2011. Treatment of *Stewartia pseudocamellia* and *Styrax japonicus* with oryzalin and ethyl methanesulfonate to develop polyploids and induce variation. Heritage Seedlings - \$3,250.

Contreras, R.N. 2010. Evaluation of *Pennisetum* spp. selections for the Pacific Northwest. University of Georgia Turfgrass Program - \$5,000.

Contreras, R.N. 2010-11. Evaluation of applications submitted to ODA for exemptions under ODA603-052-1200. ODA - \$2,050.

4. PATENT AWARDS, CULTIVAR RELEASES AND INVENTIONS

- a) *Ribes sanguineum* 'Oregon Snowflake' released 31 March 2014
 - i. US PP 26763 granted 31 May 2016
- b) *Cotoneaster xsuecicus* 'OSUCOT1' Emerald Sprite™ released 30 August 2018
 - i. USPP applied for

5. PRESS AND NEWS RELEASES

- a) All sides with Ann Fisher. Radio interview on NPR – WOSU Public Media. 2 August 2018. <http://www.tinyurl.com/y8o7h55h>
- b) Capital Press. 17 August 2018. *OSU seeks to breed better lilacs.*
- c) In the garden with Mike Darcy. Radio interview on 101KXL FM. 24 January 2015. <http://kxl.com/2015/01/24/in-the-garden-with-mike-darcy-for-01-24-15/>
- d) Oregon's Ag Progress. Winter 2015. <http://oregonprogress.oregonstate.edu/winter-2015/creating-urban-landscapes>
- e) Oregonian. *New Oregon Snowflake shrub is related to currants and gooseberries.* 27 May 2014. http://www.oregonlive.com/hg/index.ssf/2014/05/new_oregon_snowflake_shrub_is.html

D. SERVICE

1. University Service

a. Department

- i. Search Committee Skinkis Lab FRA – 2019
- ii. Promotion and Tenure Committee – 2017 – present.
- iii. Chair of peer review of teaching committee Alec Kowalewski – Fall 2016
- iv. Southern Oregon Research and Extension Center – Assistant Professor of Viticulture Search Committee 2016
- v. Peer review of teaching committee Shawn Mehlenbacher – Spring 2015
- vi. Chair of the peer review of teaching committee Kelly Donegan - Winter 2015
- vii. Chair of the peer review of teaching committee Alec Kowalewski - Fall 2014

- viii. Co-Chair Nursery Crops Production and Management Search Committee 2014; member of revised committee 2015-16
 - ix. Horticulture Administrative Assistant Search Committee 2014
 - x. Department Head Search Committee 2012-13
 - xi. Co-Chair Turf Specialist Search Committee 2012
 - xii. Horticulture Curriculum Committee 2009 – present
 - xiii. IPSI Curriculum Committee 2011 – 2012
 - xiv. Established and organized Travel Seminar 2011
 - xv. Internal Manuscript Review (2011 – 3, 2012 – 1, 2013 – 5, 2014 – 3, 2015 – 2, 2016 – 3; 2017 – 5; 2018 – 2; 2019 – 1)
- b. College of Agricultural Sciences
- i. Dean of College of Agricultural Sciences, Search Committee 2017-18.
 - ii. RM Wade Award for Distinguished Teaching, Selection Committee 2017
 - iii. CAS Faculty Awards Review Committee 2016
 - iv. Soil Fertility Search Committee, Search Advocate; Department of Crop and Soil Sciences – 2015
 - v. Achievement Rewards for College Scientists Selection Committee 2014 – 2015
 - vi. Curriculum and Assessment Committee 2013 – present
 - vii. Hazelnut Variety Advisory Committee 2013 – present
 - viii. Steering Committee for Collaborative Megaproject: *Breeding plants to address climate change* 2012 – 2015
 - ix. PBG Undergraduate Coordinator 2011 – 2016
 - x. Variety Release Committee 2010 – 2015
- c. University
- i. Faculty Student Mentor Program 2018 – 2019
 - ii. Chair Graduate Council 2017 – 2018
 - iii. 10-year program review of graduate program in History of Science 2017
 - iv. 10-year program review of graduate program in Chemical Engineering 2017
 - v. Search Committee for Associate Dean of the Graduate School 2016.
 - vi. Review Committee Oregon Lottery Graduate Scholarship 2016, 2017
 - vii. Frolander Outstanding GTA Selection Committee 2015
 - viii. Reviewer OSU Research Equipment Reserve Fund (RERF) grant applications Spring 2015.
 - ix. Graduate Council 2014 – 2019
 - x. Campus Planning Committee 2012 – 2018
 - xi. Graduation Marshall 2013 – 2018
 - xii. Faculty Senate 2013
2. Professional Service – *National and International*
- a. Scientific Committee for ISHS 3rd International Symposium on Germplasm of Ornamentals in Seoul, South Korea – 2020
 - b. External reviewer for SPARK Technology Commercialization Fund at Univ Connecticut – 2019
 - c. Pi Alpha Xi National President 2018 – 2020
 - d. Consulting Editor of J. Amer. Soc. Hort. Sci. - Genetics and Germplasm – 2017-
 - e. ASHS Outstanding Graduate Educator Selection Committee – 2016-19

- f. Chair Nursery Working Group of ASHS – 2016-17
 - g. Chair-elect Nursery Working Group of ASHS – 2015-16
 - h. USDA-NIFA-AFRI grant review panel (Plant Breeding for Agricultural Production) 2015
 - i. Pi Alpha Xi Ad Hoc Committee on Chapter Application Process 2015
 - j. Editorial Board Acta Horticulturae Proceedings of III International Symposium on Woody Ornamentals of the Temperate Zone. Minneapolis, MN. 2016
 - k. Scientific Committee member: III International Symposium on Woody Ornamentals of the Temperate Zone. Minneapolis, MN. 2016
 - l. External reviewer HATCH project for Stan Hokanson, Univ. Minnesota 2014
 - m. Editorial Board Acta Horticulturae Proceedings 13th ISHS Fire blight Workshop 2013
 - n. ASHS Nominations and Elections Committee 2013 – present
 - o. Chair USDA Woody Landscape Plant Crop Germplasm Committee 2013-14
 - p. Secretary USDA Woody Landscape Plant Crop Germplasm Committee 2012-13
 - q. Co-coordinated Workshop Sponsored by Ornamental Plant Breeding Working Group. *The Role and Importance of Polyploidy in Ornamental Plant Breeding*. 2013 Amer Soc Hort Sci Annual National Conf.
 - r. Co-coordinated Workshop Sponsored by Ornamental Plant Breeding and Invasive Plants Research Working Groups. Invasive Plants: Breeding, Production, Ecology, and Management. 2012 Amer Soc Hort Sci Annual National Conf.
 - s. Chair Ornamental Plant Breeding Working Group of ASHS – 2011-12
 - t. Chair-elect Ornamental Plant Breeding Working Group of ASHS – 2010-11
 - u. Manuscript Reviewer
 - i. J. Plant Pathology (2017 – 2)
 - ii. PLOS ONE (2016 – 1)
 - iii. Acta Horticulturae (2014 ISHS - Symposium 15, Ornamental Horticulture in the Global Greenhouse) 2014 – 1
 - iv. Plant Science (2013 – 1)
 - v. J. Amer. Soc. Hort. Sci. (2012 – 2; 2013 – 2; 2014 – 3; 2015 – 1; 2016 – 1; 2017 – 5; 2017-2019 Consulting Editor and Reviewer)
 - vi. HortScience (2010 – 4; 2011 – 3; 2012 – 5; 2013 – 4; 2014 – 2; 2015 – 2; 2016 – 3; 2017 – 4)
 - vii. HortTechnology (2011 – 1; 2013 – 1; 2019 – 2)
 - viii. African J. Biotechnol. (2012 – 1)
 - ix. Euphytica (2014 – 1; 2017 – 1)
 - x. Silvae Genetica (2015 – 1)
 - v. Member USDA Woody Landscape Plant Crop Germplasm Committee 2011 – present
 - w. Chair of Judges Panel for Bryson James Ph.D. Student Competition at the Southern Nursery Association Research Conference 2012
3. Service to the Public, professionally related
- a. Review of applications for exemption of butterfly bush cultivars under the amendment to ODA 603-052-1200
 - b. ODA Nursery Advisory Committee 2010 – 2012 (*ex officio* member)
 - c. International Plant Propagators' Society 2013 National Meeting Planning Committee 2011 – 2013

- d. Judge for the 2012, 2013, 2015 Yard Garden and Patio Show

E. PROFESSIONAL DEVELOPMENT

1. Professional Meeting Participation

- a. Third International Symposium on Woody Ornamentals of the Temperate Zone, 2016
- b. National Association of Plant Breeders, 2014
- c. 13th International Workshop on Fire Blight, 2013
- d. American Society for Horticultural Science, 2008 – 2013, 2017 – 2019
- e. Southern Nursery Association Research Conference, 2004 – 2008, 2010, 2012 – 2015, 2019

2. MEMBERSHIPS

- a. International Society for Horticultural Science
- b. American Society for Horticultural Science
- c. International Plant Propagators' Society
- d. Gamma Sigma Delta
- e. Pi Alpha Xi
- f. American Conifer Society
- g. American Penstemon Society
- h. American Rhododendron Society

3. Workshops

- a. Search Advocate Training. Panel discussion for continuing education. Office of Equity and Inclusion at OSU – 2015.
- b. Search Advocate Training. Office of Equity and Inclusion at OSU – 2014
- c. Leading Coalitions Workshop. Institute for Conservation Leadership – 2011

F. AWARDS

- a. 2018 Oregon Association of Nurseries Distinguished Education Award
- b. 2018 Western Region Award for Excellence in College and University Teaching in the Food and Agricultural Sciences
- c. 2016 Oregon Association of Nurseries President's Five Star Award
- d. 2015 R.M. Wade Award for Excellence in Teaching and Registry of Distinguished Teachers
- e. 2013 College of Agricultural Sciences Savery Outstanding Young Faculty Award