
Patricio R. Munoz **Assistant Professor**
Horticultural Science Dept., IFAS Phone: (352) 273 4837
University of Florida Email: p.munoz@ufl.edu
2211 Fifield Hall www.blueberrybreeding.com
Gainesville, FL 32603

Education:

Postdoctoral Associate Forest Genomic Lab.	University of Florida	Jan 2012-June 2013
Ph.D. Molecular Breeding	University of Florida	Jan 2010-Nov 2012
M.Sc. Quantitative Genetics	University of Florida	Aug 2007-Dec 2009
B.Sc. Forestry Engineering (Honors)	Universidad Catolica de Temuco	Mar 1998 – Oct 2004

Professional Experience:

Feb 2017-Present **Assistant Professor Blueberry Breeding and Genomics.** Horticultural Science Department, University of Florida, Gainesville, FL. Develop of improved blueberry cultivars. Leader of UF's Blueberry Breeding program. Research and mentor students on breeding, quantitative genetics, genetics and genomics. Teaching courses in Plant Breeding related topics.

July 2013-Jan 2017 **Assistant Professor Forage Breeding and Genomics.** Agronomy Department, University of Florida, Gainesville, FL. Research on Forage breeding, genetics and genomics. Leader of UF's alfalfa, bermudagrass and clovers Breeding program. Mentor students on the area of breeding, quantitative genetics and genomics. Development of improved forage cultivars for the Southern US. Teaching courses Field Plot Techniques and Advanced Plant Breeding.

April 2013 **Quantitative genetic consultant.** Texas A&M AgriLife Research-Dallas. Quantitative support in project "Plant genetics and genomics to improve drought and salinity tolerance for sustainable turfgrass production in the southern United States".

Feb 2013 **Scientific advisory board assistant,** Technology Innovation Group (TIG), Inc. Austin, TX, USA. Support TIG the "Citrus Research Development Foundation, Inc." Scientific Advisory Board.

2012-2013 **Quantitative genetic consultant.** GreenWood Resources, Portland, Oregon, USA. Trained four breeders in the use of ASReml software. Analyzed poplar clonal trials data to rank genotypes for selection, estimate genotype-by-environment and genotype-by-year interaction, among others

April 2012-Nov 2012 **Statistic consultant,** Turfgrass Breeding Program, Agronomy Dept. University of Florida. Gainesville, FL. Analyzed turfgrass breeding experiments for selection based on quality and disease/drought resistance lines. Studied the level of genotype-by-environment, and age-age correlation to define frequency and age to selection.

Jun 2010-2012 **Instructor/Consultant,** VSN International, Hemel Hempstead, United Kingdom. Organize and teach workshops on use of ASReml software, breeding and quantitative genetic theory. Classes are based on lectures and practical examples.

[CV Patricio R Munoz](#)

- Sep 2010-2012 **Quantitative genetics/Breeding consultant.** TRI-GEN Fish Ltd. British Columbia, Canada. Analysis of Salmon progeny trials, including: full-sib, genotype x environment interaction, ranking for genotype selection and genetic correlations. Recommended breeding strategies and design of experiments.
- Aug 2012 **Quantitative genetic consultant.** Fast Genetics, Saskatchewan, Canada. Analyzed sow and swine progeny data: estimated variance component; direct genetic effect, permanent environment effect and common environment for litter size, fat content, lean content, weight, feed conversion rate and number of born.
- Dec 2011 **Quantitative genetic consultant.** Nidera Argentina S.A., Venado Tuerto, Argentina. Trained 13 breeders in use of ASReml software and Genomic Selection. Analyzed corn trial data: augmented designs, genotype-by-environment and genotype-by-year interactions and spatial analysis. Recommendations on experimental design
- Jan 2010-Dec 2012 **Research assistant,** Plant Molecular and Cellular Biology. University of Florida. Analysis of Genomic data; Genomic selection, QTL analysis, Linkage Mapping. Analysis of Pine progeny trials; multivariate analysis for genetic correlations and clonal trials
- Aug 2007-Dec 2009 **Research assistant,** Cooperative Forest Genetics Research Program, University of Florida. Establishment and measure of growth, morphological, phenological and disease traits in field and greenhouse experiments. QTL analysis, Linkage Mapping.
- Jan 2008-Dec 2009 **Quantitative genetic consultant.** Forestal Mininco S.A., Los Angeles, Chile. Analyzed pine and Eucalyptus progeny trials with half-sib, full-sib and clonal data, Study longitudinal, categorical, multisite and multiage for genotype-by-environment interaction, genetic correlations and genotypes for selection.
- Sep 2005-Jul 2007 **Genetic improvement research assistant,** Forestal Mininco S.A., Los Angeles, Chile. Analyzed pine progeny trials data, including: half-sib, full-sib, clonal, longitudinal, genotype by environment interaction, genotype by age interaction, genetic correlations, ranking for genotype selection and categorical data. Supported experimental design and supervised progeny trial installation and maintenance. Assist in selection of genotypes for next breeding cycle and for operational use.
- Sep 2004-Nov 2004 **Grant proposal assistant,** Universidad Catolica de Temuco, Chile. Revised and formatted university-wide grant projects for national competition.

Grants, Awards and Fellowships:

- 2017 **University of Florida.** Richard L. Jones Outstanding New Faculty research Award.
- 2017 Bermudagrass (*Cynodon dactylon* L.) A potential host and reservoir of new viruses.
Co-PI
- 2017 **Florida Cattle Enhancement Board.** Development of Improved Forage Cultivars and Management Systems for Florida Conditions. **\$56,000 PI.**
- 2016 **University of Florida.** Excellence Award for Assistant Professors, given to only 10 faculty on the entire UF campus annually.

- 2016 **NSF-IOS.** Genetic and physiological mechanisms of local climatic adaptation in a widespread perennial plant species. Collaborative. **Collaborative-PI. \$248,210 (\$ 1.17 Million)**
- 2016 **USDA- Sustainable Agriculture Research & Education.** Cover Crop Diversity through Evaluation and Increase from Breeder Stocks and Germplasm Repositories. **Co-PI. \$25,594 (\$201,248).**
- 2015 **USDA-NIFA.** Persistence, Survival, and Recovery of Warm-Season Turfgrass Selections for Sustainable Urban Landscapes Under Limited Irrigation and Long-Term Drought. **Co-PI. \$224,055 (\$4.44 Million).**
- 2015 **Milk Check-Off.** A High Manure Uptake Bermudagrass/Stargrass for Dairy Production. **PI. \$17,160.**
- 2015 **UF-Plant Breeding Working Group.** Development of improved forages for Florida. **PI. \$26,255.**
- 2015 **UF-IFAS Early Career Seed Funds.** Discovery of the molecular mechanism for 2,4-D herbicide resistance. **PI. \$49,380.**
- 2015 **UF-Agronomy.** Improving Cold Units for Forage and Small Grain Seed Storage. **Co-PI. \$4,134.**
- 2014 **USDA.** Improving breeding efficiency in autotetraploid with genome-wide prediction. **PI. \$500,000.**
- 2014 **Sustainable Agriculture Research & Education (SARE).** Evaluation of clovers as cover crop to decrease nematode populations on peanut production. **PI. \$11,000.**
- 2014 **Milk Check-Off.** Developing Improved Alfalfa Cultivars for Florida. **PI. \$11,300.**
- 2014 **UF Plant Breeding Graduate Initiative.** Development of cultivars of bermudagrass resistant to stem maggot. **PI. \$48,000.**
- 2014 **UF-IFAS Equipment and Facilities.** Equipping the Forage Breeding Lab. **PI. \$16,400.**
- 2013 **UF-Office of Technology Licensing.** Technology Innovator.
- 2013 **USDA-DOE.** Accelerated development of optimal feedstock for bioenergy and renewable chemicals using genome-wide selection. **Co-PI. \$225,380 (\$1,000,000).**
- 2013 **USDA-NIFA.** Accelerated breeding by improving accuracy and mate allocation using Genome-Wide selection. **Co-PI. \$211,744 (\$500,000).**
- 2012 **Best Graduate Student Dissertation** Plant Molecular and Cellular Biology Program, University of Florida, FL, USA
- 2011 **USDA, Honor Award for Excellence:** “For collaborative research and outreach approach to successful development and application of genomic-based tree breeding technology that will enhance US competitiveness in the production of forest products”
- 2010-2012 **Plant Molecular Breeding Initiative Grant Fellowship**, University of Florida, FL, USA
- 2011 **IUFRO, Best Poster Award** at the Union of Forest Research Organizations: “Award at best poster selected out 200: “Effect of Alternative BLUP-breeding value prediction on the accuracy of genomic selection” Arraial d’ Ajuda, Bahia, Brazil.

- 2011 **SFTIC, Zobel Award for Best Presentation** at the Southern Forest Tree Improvement Conference Biloxi, MS, USA
- 2004 Universidad Catolica de Temuco, **Double Award for Outstanding Student and Greatest Effort**, Temuco, Chile
- 2002-2004 Universidad Catolica de Temuco, **Top Honor Student Award**, Temuco, Chile

Publications

I. Peer Reviewed Journal Publications (31) (g=graduate student, u=undergraduate, underline=senior, Postdoc=p, other=&):

31. Xing L. (g), S. Gezan, K. Kenworthy, and **P. Munoz**. Genetic parameters and genotype-by-environment interaction of zoysiagrass in Florida. **Submitted** *Euphytica*.
30. Figueiredo U.J. (g), J.A. Rodrigues, C.V. Borges, S.C. Barrios, K. Quesenberry, and **P. Munoz**. Evaluating early selection in perennial tropical forages. **Submitted** *Plant Breeding*.
29. Müller B (g), L. Neves, J. Filho, M. Resende Jr, **P. Muñoz**, P. Santos, E. Filho, M. Kirst, D. Grattapaglia. 2017. Genomic prediction and GWAS in breeding populations of *Eucalyptus benthamii* and *E. pellita* using high-density SNP genotyping. **Submitted** *BMC Genomics*.
28. Klápště J (&), I. Porth, O. Skyba, A. McKown, **P. Munoz**, M. Resende, D. Garrick, R. Guy, C. Douglas, S. Mansfield, Y. El-Kassaby. 2017. Genome-enabled prediction in the context of linkage disequilibrium heterogeneity and multiple environments using unrelated populations. **Submitted** *Heredity*.
27. Rios E. (g), K. Kenworthy, A. Blount, K. Quesenberry, B. Unruh, J. Erickson, F. Altpeter, and **P. Munoz**. 2017. Breeding Apomictic Bahiagrass (*Paspalum notatum* Flugge) with Improved Turf Traits. *Plant Breeding*. **In press**
26. Lopez J. (g), J. Erickson, **P. Munoz**, A. Saballos, T. Felderhoff, and W. Vermerris. 2017. QTL Associated with crown root angle, stomatal conductance, and maturity in sorghum. *The Plant Genome*. **In press (First Look online)**.
25. Pereira M. (u), E. Rios (g), K. Kenworthy, K. Quesenberry, A. Blount, J. Erickson, F. Altpeter and **P. Munoz**. 2017. Turf-type bahiagrass (*Paspalum notatum* Flugge) performance for root and shoot traits under various nitrogen regimes. *International Turfgrass Society Research Journal*. **In press**
24. Amadeu R. (u), C. Cellon (g), J. Olmstead, A. Garcia, M. Resende, **P. Munoz**. 2016. AGHmatrix: R package to construct relationship matrices for autotetraploid and diploid species, a Blueberry Example. *The Plant Genome* 9(3):1-10
23. Inostroza L. (p), H. Acuña, **P. Munoz**, C. Vasquez, J. Ibañez, G. Tapia, M.T. Pino and H. Aguilera. 2016. Using aerial images and canopy spectral reflectance for high-throughput phenotyping of white clover. *Crop Science* 56(5):2629-2637.
22. Hunter S. (g), J. Ferrell, T. Webster, J. Fernandez, P. Dittmar, **P. Munoz** and G. MacDonald. 2016. Impact of irrigation volume on PRE herbicide Activity. *Weed Technology* 30(3):793-800.
21. Filho J. (g), J. Rodrigues (g), F. Silva, M.D. Resende, **P. Munoz**, M. Kirst, and M. Resende Jr. 2016. The contribution of dominance to phenotype prediction in a pine breeding and simulated population. *Heredity* 117:33-41.

20. Sasson D. (g), **P. Munoz**, S. Gezan and C. Miller. 2016. Resource quality affects weapon and testis size and the ability of these traits to respond to selection in the leaf-footed cactus bug, *Narnia femorata*. *Ecology and Evolution* 6(7): 2098-2108. doi:10.1002/ece3.2017
19. Silva F. (g), **P. Munoz**, C. Vincent, and A. Pio. 2016. Generating relevant information for breeding *Passiflora edulis*: genetic parameters and population structure. *Euphytica* 208(3): 609-619. doi:10.1007/s10681-015-1616-8.
18. Kumar S. (&), C. Molloy, **P. Munoz**, H. Daetwyler, D. Chagne, and R Volz. 2015. Genome-enabled estimates of additive and non-additive genetic effects and prediction of apple phenotypes across environments. *G3: Genes, Genomes, Genetics* 5: 2711-2718. doi:10.1534/g3.115.021105.
17. Rios E. (g), K. Kenworthy and **P. Munoz**. 2015. Association of phenotypic traits with ploidy and genome size in annual ryegrass. *Crop Science* 55(5): 2078–2090. doi:10.2135/cropsci2015.01.0039.
16. Quesenberry K. (&), A. Blount, **P. Munoz**, J. Ferrell, and J.C. Dubeux. 2015. Registration of ‘FL24D’, a red clover selected for tolerance to 2,4-D herbicide. *Journal of Plant Registrations* 9: 288-293. doi:10.3198/jpr2014.11.0081crc
15. Westbrook J. (g), V.E. Chhatre (g), L. Wu, S. Chamala (g), L.G. Neves, **P. Munoz**, P.J. Martinez-Garcia, D.B. Neale, M. Kirst, D.C. Nelson, K. Mockaitis, G.F. Peter, J.M. Davis, and C.S. Echt. 2015. A consensus genetic map for *Pinus taeda* and *Pinus elliottii* and extent of linkage disequilibrium in two genotype-phenotype discovery populations of *Pinus taeda*. *G3: Genes, Genomes, Genetics* 5(8): 1685-94. doi:10.1534/g3.115.019588.
14. Ferreira C.A. (g), M.D.V. Resende, F.F. Silva, J.M.S. Viana, M.S.V. Ferreira, M.F.R. Resende Jr, and **P. Munoz**. 2015. Ridge, Lasso and Bayesian additive-dominance genomic models. *BMC Genetics* 16(105): 1-13. doi:10.1186/s12863-015-0264-2
13. Westbrook J. (g), A.R. Walker (p), G.L. Neves, **P. Munoz**, M.F. Resende Jr., D.B. Neale, J.L. Wegrzyn, D.A. Huber, M. Kirst, J.M. Davis, and G.F. Peter. 2015. Discovering candidate genes that regulate resin canal number in *Pinus taeda* stems by integrating genetic analysis across environments, ages, and populations. *New Phytology* 205(2): 627-641. doi: 10.1111/nph.13074
12. Chandra A. (&), A.D. Genovesi, B.W. Wherley, S.P. Metz, J.A. Reinert, Y-Z. Wu, P. Skulkaew, M.C. Engelke, D. Hargey, L.R. Nelson, B.M. Schwartz, P.L. Raymer, Y. Q. Wu, D.L. Martin, S.R. Milla-Lewis, G. Miller, K.E. Kenworthy and P. Munoz. 2015. Registration of ‘DALSA 0605’ St. Augustinegrass. *Journal of Plant Registrations* 9(1): 27-34. doi:10.3198/jpr2014.05.0036crc
11. **Munoz P.**, M.F. Resende Jr., S. Gezan, M.D. Resende, G. de los Campos, M. Kirst, D. Huber, and G. Peter. 2014. Unraveling additive from non-additive effects using genomic relationship matrices. *GENETICS* 198: 1759-1768. doi:10.1534/genetics.114.171322
10. **Munoz P.**, M.F. Resende Jr., D. Huber, T. Quesada, M.D. Resende, M. Kirst and G. Peter. 2014. Genomic relationship matrix for correcting pedigree errors in breeding populations: impact on genetic parameters and genomic selection accuracy. *Crop Science* 54(3):1115-1123. doi:10.2135/cropsci2012.12.0673
09. Quesenberry K. (&), **P. Munoz**, A. Blount, K. Kenworthy, and W. Crow. 2014. Breeding forages in Florida for resistance to nematodes. *Crop & Pasture Science* 65: 1192-1198. doi.org/10.1071/CP13437

08. Quesada T. (p), M.F. Resende Jr. (g), **P. Munoz**, J. Wegrzyn, D. Neale, M. Kirst, G. Peter, S. Gezan, D. Nelson, and J. Davis. 2014. Mapping fusiform rust resistance genes within a complex mating design of Loblolly pine. *Forest* 5(2): 347-362. doi:10.3390/f5020347
07. Westbrook J. (g), M.F. Resende Jr., **P. Munoz**, A.R. Walker (g), J.L. Wegrzyn, C.D. Nelson, D.B. Neale, M. Kirst, D. Huber, S. Gezan, G.F. Peter and J.M. Davis. 2013. Association genetics of oleoresin flow in loblolly pine: discovering genes and predicting phenotype for improved resistance to bark beetles and bioenergy potential. *New Phytology*. 199: 89-100. doi:10.1111/nph.12240.
06. Flor N. (g), **P. Munoz**, P. Harmon, and K. Kenworthy. 2013. Response of Seashore paspalum genotypes to Dollar Spot Disease. *International Turfgrass Society Research Journal*. 12: 119-126. ISSN 1817-0641
05. Resende Jr. M.F. (g), **P. Munoz (g)**, M.D. Resende, D.J. Garrick, R.L. Fernando, J. Davis, E.J. Jokela, T.A. Martin, G.F. Peter, and M. Kirst. 2012. Accuracy of genomic selection methods in a standard dataset of loblolly pine (*Pinus taeda* L.). *GENETICS* 190: 1503-1510. doi: 10.1534/genetics.111.137026
04. **Munoz P. (g)**, D. Huber, and T. Martin. 2012. Relative contribution of crown and phenological traits to growth of a pseudo-backcross family (slash x loblolly) x slash) and its pure species progenitors. *Tree Genetics and Genomes* 8(6): 1281-1292. doi:10.1007/s11295-012-0514-7.
03. Resende Jr. M.F. (g), **P. Muñoz (g)**, J. Acosta, G. Peter, J. Davis, D. Grattapaglia, M.D. Resende, and M. Kirst. 2012. Accelerating the domestication of trees using genomic selection: accuracy of prediction models across ages and environments. *New Phytologist* 193(3): 617-624. doi:10.1111/j.1469-8137.2011.03895.x.
02. **Munoz P. (g)**, D. Huber, and J. Butnor. 2011. Phenotypic analysis of first-year traits in a pseudo-backcross {(slash x loblolly) x slash} and the open-pollinated families of the pure-species progenitors. *Tree Genetics and Genomes* 7(1): 183-192. doi:10.1007/s11295-010-0324-8.
01. Resende M.D.V. (&), F.F. Silva, J.M.S. Viana, L.A. Peternelli, M.F. Resende Jr, and **P. Munoz**. 2011. Statistics methods in genomic wide selection (*Original in Portuguese: "Metodos estadisticos na selecao genomica ampla"*). Embrapa Documents 219. Online version. Brazil. ISSN 1980-3958

II. Non-refereed Journal Publications (10) (g=graduate student, u=undergraduate, underline=senior):

10. **Munoz P.**, K. Quesenberry, A. Blount, J.A. Ferrel, and J.C. Dubeux. 2014. A new red clover 2,4-D resistant cultivar to improve broadleaf weed control and elucidate the molecular mechanism of resistance. In: *Molecular Breeding of Forage and Turf* (Editors: Budak,H and G. Sangenberg). 236 p.
09. Blount A., J. Vendramini, J. Dubeux, A. Babar, K. Kenworthy, **P. Munoz**, and K. Quesenberry. 2014. 2014 Cool-Season Forage Variety Recommendations for Florida. UF EDIS #SS-AGR-84
08. Newman Y., J. Dubeux, **P. Munoz**, and K. Quesenberry. 2014. Winter Forage Legume Guide. UF EDIS #SS-AGR-49.
07. Dubeux J., and **P. Munoz**. 2014. Alfalfa Production in North Florida. *Southern Cattle Advisor*. Available through internet: <http://www.secattleadvisor.com/2014/12/01/alfalfa-production-in-north-florida/>.

06. Gezan S, M. Kirst, **P. Munoz**, G. Peter, G. Powell, J. Zhang. 2013. Cooperative Forest Genetics Research Program, Fifty-fifth annual progress report. Gainesville, FL
05. Balmant K, S. Gezan, M. Kirst, **P. Munoz**, G. Peter, G. Powell, M. Resende, and J. Zhang. 2012. Cooperative Forest Genetics Research Program, Fifty-fourth annual progress report. Gainesville, FL
04. Gezan S, M. Kirst, **P. Munoz**, G. Peter, and G. Powell. 2011. Cooperative Forest Genetics Research Program, Fifty-third annual progress report. Gainesville, FL
03. Huber D, **P. Munoz**, and G. Powell. 2010. Cooperative Forest Genetics Research Program, Fifty-second annual progress report. Gainesville, FL
02. Huber D, X. Li, **P. Munoz**, G. Peter, and G. Powell. 2009. Cooperative Forest Genetics Research Program, Fifty-first annual progress report. Gainesville, FL
01. Huber D, **P. Munoz**, and G. Powell. 2008. Cooperative Forest Genetics Research Program, Fiftieth annual progress report. Gainesville, FL

III. Abstracts (35) (g=graduate student, u=undergraduate, underline=senior):

35. E. Rios (g), M. Resende Jr., M. Kirst, M.D. Resende, J. Filho, and **P. Munoz**. 2016. Genome-wide Family Prediction. National Association of Plant Breeders. 15-18 August 2016, Raleigh, North Carolina, USA.
34. **Munoz P.**, E. Rios (g), M. Resende Jr., M. Kirst, M.D. Resende, and J. Filho. 2016. Genome-wide Family Prediction. 5th International Conference of Quantitative Genetics (ICQG) June 2016, Madison, Wisconsin, USA.
33. Bhakta M. (p), L. Inostroza, M. Kirst, M. Resende Jr., J. Endelman, and **P. Munoz**. 2016. Genome-wide Family Prediction. 5th International Conference of Quantitative Genetics (ICQG) June 2016, Madison, Wisconsin, USA.
32. Xing L. (g), K. Kenworthy, S. Gezan, B. Unruh, and **P. Munoz**. 2016. Post-hoc blocking and genotype-by-environment interaction in zoysiagrass. 5th International Conference of Quantitative Genetics (ICQG) June 2016, Madison, Wisconsin, USA.
31. Santos R. (g), B. Moraes (g), A. Missiaglia, A. Aguiar, B. Lima, D. Dias, G. Resende, F. Gonzalves, **M. Resende Jr., P. Munoz, and M. Kirst**. 2016. Comparing genotypic methods for development of genomic selection models in Eucalyptus. 5th International Conference of Quantitative Genetics (ICQG) June 2016, Madison, Wisconsin, USA.
30. Muller B. (g), L. Neves, J. Filho, M. Resende Jr., A. Fahrenkrog, **P. Munoz**, M. Kirst and D. Grattapaglia. 2016. Impact of relatedness on genomic prediction and GWAS detection in two elite eucalyptus breeding populations. 5th International Conference of Quantitative Genetics (ICQG) June 2016, Madison, Wisconsin, USA.
29. **Munoz P.**, J. Dubeux, B. Anderson, B. Shwartz, J. Vendramini, M. Saha, M. Castillo, S. Milla-Lewis, and A. Rucker (g). 2016. Genomic Progress in Bermudagrass. Plant and Animal Genome (PAG) Jan 2016, San Diego, California, USA.
28. Bhakta M. (p), and **P. Munoz**. Characterizing Genetic Factors Involved in 2,4-D Resistance using the Red Clover. Plant and Animal Genome Jan 2016. San Diego, CA, USA. Poster Presentation

27. Rios, E. (g), K. Kenworthy and **P. Munoz**. 2016. Predictive Ability of Genomic Estimated Family Values (GEFV). Plant and Animal Genome Jan 2016. San Diego, CA, USA. Poster Presentation
26. **P. Munoz**, K. Kenworthy, A. Chandra, Y. Wu, D. Martin, B. Schwartz, P. Raymer, and S. Milla-Lewis. 2015. Effect of Drought on Genotype-by-Environment Interaction on Warm-Season Turfgrasses. ASA, CSSA and SSSA International Annual Meetings. Minneapolis, MN November 15-19.
25. Quesenberry K., **P. Munoz**, and A. Blount. 2015. Breeding Vegetatively Propagated Warm Season Grasses in Florida: Past, Present, and Future. 5th International Symposium of Forage Breeding (ISFB 2015). October 19–21, in Buenos Aires, Argentina.
24. Ibáñez J. (g), H. Acuña, **P. Muñoz**, M. Gonzales, and L. Inostroza. 2015. Genetic structure of a white clover association mapping population. 5th International Symposium of Forage Breeding (ISFB 2015). October 19–21, in Buenos Aires, Argentina.
23. Cellon C. (g), R. Amadeu (u), M. Kirst, **P. Munoz** and J. Olmstead. 2015. Establishing genome-wide selection for *Vaccinium corybosum*. National Association of Plant Breeding (NAPB) July 28-30 2015, Pullman, Washington State, USA.
22. Müller B. (g), L. Neves, M.F. Resende, **P. Munoz**, M. Kirst, P. Santos, E. Paludzyszyn, and D. Grattapaglia. 2015. Genomic Selection for growth traits in *Eucalyptus benthamii* and *E. pellita* populations using a genome-wide Eucalyptus 60K SNPs chip. Tree Biotechnology Conference. June 8-12, Florence, Italy. Poster Presentation
21. Chandra A., K. Kenworthy, B. Schwartz, P. Raymer, Y. Wu, S. Milla-Lewis, L. Nelson, **P. Munoz**, Q. Yu, J. Moss, B. Wherley, G. Miller, D. Martin, F. Waltz, B. Unruh, W. Reynolds, T. Boyer, C. Chung and M. Palma. 2015. Plant Genetics and Genomics to Improve Drought and Salinity Tolerance for Sustainable Turfgrass Production in the Southern United States. ASA, CSSA and SSSA International Annual Meetings. Minneapolis, MN November 15-19.
20. Lopez J. (g), J. Erickson, **P. Muñoz**, A. Saballos, W. Vermerris, T. Felderhoff. 2015. QTLs and Candidate Genes for Root Architecture and Reduced Stomatal Conductance in Sorghum. ASA, CSSA and SSSA International Annual Meetings. Minneapolis, MN November 15-19.
19. Saha M., T. Butler, M. Monteros, M. Tremmell, and **P. Munoz**. 2015. Prospective for Breeding Cover Crop Cultivars for the South. ASA, CSSA and SSSA International Annual Meetings. Minneapolis, MN November 15-19.
18. Rios, E. (g), K. Kenworthy and **P. Munoz**. 2015. Association of Phenotypic Traits with Ploidy and Genome Size in Annual Ryegrass. ASA, CSSA and SSSA International Annual Meetings. Graduate Student Oral Competition. Minneapolis, MN November 15-19.
17. Xing, L. (g), K. Kenworthy and **P. Munoz**. 2015. Improving Selection Accuracy with Post-Hoc Blocking in Turfgrass Breeding. ASA, CSSA and SSSA International Annual Meetings. Graduate Student Competition. Minneapolis, MN November 15-19.
16. Rucker, A. (g), **P. Munoz**, J. Dubeux, J. Vendramini, B. Anderson, B. Shwartz and M. Saha. 2015. Bermudagrass Breeding: What is next? ASA, CSSA and SSSA International Annual Meetings. Graduate Student Poster Competition. Minneapolis, MN November 15-19.
15. Rios, E. (g), K. Kenworthy, A. Blount, K. Quesenberry, B. Unruh, F. Altpeter and **P. Munoz**. 2014. Novel Turf-type Bahiagrass. ASA, CSSA and SSSA International Annual Meetings. Division C5: Graduate Student Oral Competition. Long Beach, CA, November 1-5.

14. Almeida J (g), J. Rodrigues (g), M.F. Resende, R. Santos (g), **P. Muñoz**, and M. Kirst. 2015. Including Dominance Effects in Genomic Selection Regression Models with Different Priors – Pinus taeda. Plant and Animal Genome XXI (PAG) January 10-14 2015, San Diego, California, USA.
13. Rodrigues J (g), J. Almeida (g), R. Santos (g), M.F. Resende, **P. Muñoz**, and M. Kirst. 2015. Inclusion of Dominance and GxE Effects in genomic Selection Models to Improve Predictive Ability. Plant and Animal Genome XXI (PAG) January 10-14 2015, San Diego, California, USA.
12. Olmstead J., C. Cellon(g), R. Amadeu (u), and **P. Munoz**. 2015. Toward Genomic Selection in Blueberry. Plant and Animal Genome XXI (PAG) January 10-14 2015, San Diego, California, USA.
11. **Munoz P**. A new red clover 2,4-D resistant cultivar to improve broadleaf weed control and elucidate the molecular mechanism of resistance. 8th International Symposium on Molecular Breeding of Forage and Turf. June 2014 Istanbul, Turkey. Oral Presentation
10. **Munoz P**. 2013. Maximize the use of molecular information in breeding. International IUFRO Tree Biotechnology Conference. May 26-June 01, Asheville, NC, USA. Oral Presentation
09. Resende Jr. M (g), M.D. Resende, **P. Munoz**, E. Takahashi, C. Petroli, C. Sansaloni, M. Kirst, and D. Grattapaglia. 2013. Increase in Efficiency of Genomic Selection Using Epistatic Interactions and Detection of Candidate Genes for Rust Resistance in Eucalyptus. Plant and Animal Genome XXI (PAG) January 12-16 2013, San Diego, California, USA.
08. **Munoz P**, M.F. Resende, M.D. Resende, S. Gezan, M. Kirst, and G. Peter. 2012. The Re-discovery of the Dominance Variation by Using the Observed Relationship Matrix and its implications in breeding. Fourth International Conference of Quantitative Genetics (ICQG) June 17-22 2013. Edinburgh, Scotland, UK. Poster Presentation
07. **Munoz P**, M.F. Resende, S. Gezan, M.D. Resende, M. Kirst, D. Huber, G. Campos, and G. Peter. Re-discovering non-additive effects with genomic relationship matrices and implications in breeding. Plant and Animal Genome Jan 2012. San Diego, CA, USA. Poster Presentation
06. **Munoz P**, M.F. Resende, M.D. Resende, D. Garrick, R. Fernando, G. Peter, and M. Kirst. 2012. “Benchmarking genomic prediction in forestry – what works and what doesn’t for some growth, disease and resistance and developmental traits”. Plant and Animal Genome XX (PAG) January 2012, San Diego, California, USA. Poster Presentation
05. **Munoz P.**, M.F. Resende, D. Huber, T. Quesada, M.D. Resende, M. Kirst and G. Peter. 2011 “Effect of Alternative BLUP-breeding value prediction on the accuracy of genomic selection”. 31th Southern Forest Tree Improvement Conference (SFTIC) June 13-16 2011, Biloxi Mississippi, USA.
04. Kirst M, **P. Muñoz** and M.F. Resende. 2011 “Hyper-Accelerating Breeding and Adaptation of loblolly pine using genomic selection”. 31th Southern Forest Tree Improvement Conference (SFTIC) June 13-16 2011, Biloxi Mississippi, USA.
03. **Munoz P**, M.F. Resende, G. Peter, D. Huber, M. Kirst, and T. Quesada 2011. Effect of BLUP prediction on genomic selection: Practical considerations to achieve greater accuracy in genomic selection. BMC proceedings 5(Suppl 7): P49
02. Resende M, **P. Muñoz**, J. Acosta, M.D. Resende, D. Grattapaglia, and M. Kirst. 2011. Stability of genomic selection prediction models across ages and environments. BMC proceedings 5(Suppl 7): O14

01. Kirst M, M.F. Resende, **P. Munoz**, and L. Neves. 2011. Capturing and genotyping the genome-wide genetic diversity of trees for association mapping and genomic selection. BMC proceedings 5(Suppl 7): 149

Presentations at Conferences, Scientific Meetings and Seminars (28)

I. International (14)

14. **Munoz P.**, L. Xing, L. Inostroza, and M. Bhakta. 2016. Phenotyping in the Genomic Era. International Symposium of Genetics and Plant Breeding. Phenomics: a New Era of Biometrics. July 27-28 2016, Universidad Federal of Lavras, Lavras, Brazil. **Invited Speaker**
13. **Munoz P.**, E. Rios (g), M. Resende Jr., M. Kirst, M.D. Resende, and J. Filho. Genome-wide Family Prediction. 5th International Conference of Quantitative Genetics (ICQG) June 2016, Madison, Wisconsin, USA. **Poster Presentation**
12. **Munoz P.**, J. Dubeux, B. Anderson, B. Shwartz, J. Vendramini, M. Saha, M. Castillo, S. Milla-Lewis, and A. Rucker. 2016. Genomic Progress in Bermudagrass. Plant and Animal Genome (PAG) Jan 2016, San Diego, California, USA. **Invited Speaker**
11. **Munoz P.**, K. Kenworthy, A. Chandra, Y. Wu, D. Martin, B. Schwartz, P. Raymer, S. Milla-Lewis. Effect of Drought on Genotype-by-Environment Interaction on Warm-Season Turf Grasses. ASA, CSSA and SSSA International Annual Meetings. November 15-19 2015. Minneapolis, MN. **Invited Speaker**
10. **Munoz P.** A new red clover 2,4-D resistant cultivar to improve broadleaf weed control and elucidate the molecular mechanism of resistance. 8th International Symposium on Molecular Breeding of Forage and Turf. June 9-12 2014 Istanbul, Turkey. **Selected Speaker**
09. **Munoz P.** Forage Breeding and Genomics. Instituto de Investigacion Agropecuaria (INIA). May 15 2014 Chillan, Chile. **Invited Speaker and Instructor.**
08. **Munoz P.**, Resende M, Kirst M and L. Neves. Applications of genomic data in breeding. Embrapa. July 2013 Brasilia Brazil. **Invited Instructor.**
07. **Munoz P.** Use of molecular data in breeding. University of Talca. July 2013 Talca Chile. **Invited Speaker**
06. **Munoz P.** Maximize the use of molecular information in breeding. Chilean Fruit Consortium. July 2013 Santiago Chile. **Invited Speaker**
05. **Munoz P.** Maximize the use of molecular information in breeding. Forestal Mininco S.A. July 2013. Temuco, Chile. **Invited Speaker**
04. **Munoz P.** Maximize the use of molecular information in breeding. IUFRO Tree Biotechnology. May 26th-June 1st 2013 Asheville, NC, USA. **Invited Speaker**
03. **Munoz P.** Quantitative Genetics and Genomic Selection Forestry Workshop. Plant and Animal Genome XXI (PAG). January 12-16 2012 San Diego, California, USA. **Moderator**
02. **Muñoz P.**, Resende M, Resende MD, Gezan S, Kirst M, Peter GF. 2012. The Re-discovery of the Dominance Variation by Using the Observed Relationship Matrix and its implications in breeding. Fourth International Conference of Quantitative Genetics (ICQG) June 17-22 2012. Edinburgh, Scotland, UK. **Poster Presentation**
01. **Muñoz P.**, Resende M, Resende MD, Garrick DJ, Fernando RL, Peter GF, Kirst M. 2012. "Benchmarking genomic prediction in forestry – what works and what doesn't for some

growth, disease and resistance and developmental traits”. Plant and Animal Genome XX (PAG) January 14-18 2012, San Diego, California, USA. **Poster Presentation**

II. National (09)

09. **Munoz P.**, and L. Inostroza. How are we impacting the roots when selecting for persistence and nitrogen content. Root Biology Workshop. The Samuel Roberts Noble Foundation. November 05 **2015**. Ardmore, OK, USA. **Invited Speaker**
08. **Munoz P.** Uptades on New Forages for Florida. Central Florida Pasture Management Conference. October 1-2 **2015**. Brevard County FL. **Invited Speaker**
07. **Munoz P.** Forage Breeding and Genomic Lab. Plant Molecular and Cellular Biology Retreat. May 8-9, **2015** Daytona, FL. **Selected Speaker**
06. **Munoz P.** Genomic Prediction for Breeding. Seminar for Plant Breeding. Oct 03 **2014** Raleigh, NC, USA. **Invited Speaker**
05. **Munoz P.** Forage Breeding and Genomics. Seminar for Crops Science. Oct 02 **2014** Raleigh, NC, USA. **Invited Speaker**
04. **Munoz P.** Breeding and Genomics. Institute of Plant Breeding, Genetics and Genomics (IPBGG). May 19-20 **2014** Tifton, GA, USA. **Invited Speaker**
03. **Munoz P.** Maximize the use of genomic information in breeding. National Association of Plant Breeders (NAPB). June 2-5 **2013** Tampa, FL, USA. **Invited Speaker**
02. **Munoz Del Valle PR**, Resende MF, Huber D, Quesada T, Resende MD, Kirst M and Peter G. “Effect of Alternative BLUP-breeding value prediction on the accuracy of genomic selection”. 31th Southern Forest Tree Improvement Conference (SFTIC) June 13-16 **2011**, Biloxi Mississippi, USA. **Selected Speaker**
01. **Munoz Del Valle PR**, Huber D, Butnor J. “Introgression of Loblolly Pine Genes into Slash Pine”. 30th Southern Tree Improvement Conference (SFTIC) May 31- June 03 **2009**, Blacksburg, VA, USA. **Selected Speaker**

III. Local (06)

06. **Munoz P.** Genotypic Prediction Using Family Bulks. UF Animal Science Seminars Series. March 08 **2016**, Gainesville, FL. **Invited Speaker**
05. **Munoz P.** Breeding and Genomic. Corn Metabolomics Grant Project Meeting. May 18 **2015**. Gainesville, FL. **Invited Speaker**
04. **Munoz P**, Kirst M and Resende M. Phenotypic prediction using genomic data. UF Genetic Institute. Aug 11 **2014** Gainesville, FL, USA. **Organizer and Moderator**
03. **Munoz P.** Updates on Bermudagrass and Alfalfa Breeding. Florida Seed Association. June 25 **2014** Citra, FL, USA. **Invited Speaker**
02. **Munoz P.** Update in Alfalfa Breeding and Cultivar Testing. Corn Silage Field Day. May 29 **2014** Citra, FL, USA. **Invited Speaker**
01. **Munoz P**, and Resende M. Phenotypic prediction using genomic data. UF Genetic Institute. Aug 19 **2013** Gainesville, FL, USA. **Organizer and Moderator**

Teaching:

I. Teaching Context: I currently teach two graduate level courses, Field Plot Techniques (AGR 5266C) and Advanced Plant Breeding (AGR6322). Both courses were developed in fall 2014. Field Plot Techniques is relevant for graduate students in IFAS because it reviews the most common statistical designs in biological sciences for field, greenhouse and laboratory experiments. The objective of this course is to expose students to these different designs and to provide hands-on experience in designing and analyzing experimental data. Advanced Plant Breeding is very relevant for plant breeding graduate students. The objective of this course is to expose students to advanced methods of breeding that require a higher level of knowledge of genetics and genomics.

II. Teaching Evaluation: My “overall rating of instructor” given by my students is higher than departmental and college averages for both years I have taught (Table 1 below). In addition, a 2015 peer auditing of my class has 7 out 10 outstanding scores, while the remainder 3 are in the satisfactory category and almost no changes were recommended (Table 2 below).

Table 1. Overall student evaluation rating of instructor.

Course	Term	# Students	Req Y/N	Team Taught	Response Rate	Overall Rating of Instructor		
						Instructor	Department	College
AGR5266C	F16	23	Yes	87.5	83%	4.89	4.47	4.53
AGR5266C	F15	18	Yes	No	89%	4.56	4.53	4.53
AGR5266C	F14	24	Yes	No	75%	4.56	4.34	4.47
AGR4932	F16	1	No	No	100%	5.00	3.94	4.44
AGR6932	F16	2	Yes	No	100%	3.50	4.47	4.53
AGR6322	F16	17	Yes	No	82%	4.93	4.47	4.53
AGR6322	F14	6	Yes	No	100%	4.33	4.34	4.47
PCB7922	F13	9	Yes	50%	78%	4.86	4.49	4.50

Rating Scale: 1 = Poor, 2 = Below Average, 3 = Average, 4 = Above Average, 5 = Excellent

Table 2. Peer review evaluation of AGR5266C, Fall 2015.

	In need of Improvement	Satisfactory	Outstanding
Course content			x
Course organization			x
Syllabus		x	
Other handouts		x	
Quizzes, exams, and other course requirements			x
Instructor enthusiasm			x
Classroom technique			x
Innovations			x
Student involvement/participation		x	
Overall course rating			x

Operational Definitions: Outstanding- performance far surpasses the expected level for such activities in most respects. Satisfactory- performance meets expected level for such activities in most, if not all, respects. In need of improvement- performance fails to meet expected levels for such activities in several key respects.

III. Teaching courses, Invited lectures and workshops

Graduate Course Instructor. AGR6322 - Advanced Plant Breeding. University of Florida, Gainesville, FL, USA. Since Fall 2014. Fall even-years.

Graduate Course Instructor. AGR5266C – Field Plot Techniques. University of Florida, Gainesville, FL, USA. Since Fall 2014. Fall every year.

Invited Guest Lecturer: Genomic Selection. In course “Molecular Markers for Breeder”. University of Florida, Gainesville, FL, USA. November 2014

Graduate Course Instructor. PCB7922 – Journal Colloquium on Molecular Breeding. University of Florida, Gainesville, FL, USA. Fall 2013

Invited Guest Lecturer: Genomic Selection. In course “Molecular Markers for Breeder”. University of Florida, Gainesville, FL, USA. November 2012

Workshop Instructor: Analysis of Experiments Using ASReml, including Genomic Selection. VSN International, Atlanta, GA, USA. Oct 15-16 2012

Invited Guest Lecturer: Analysis of Genetic Data for Breeding. In course “Advanced Plant Breeding”. University of Florida, Gainesville, FL, USA. April 2012

Workshop Instructor: Analysis of Experiments Using ASReml (with emphasis on Breeding Trials). VSN International, Gainesville, FL, USA. Feb. 23-24 2012

Workshop Instructor: Analysis of Experiments Using ASReml (with emphasis on Breeding Trials). VSN International, Venado Tuerto, Argentina. Dec. 13-15 2011 (Private)

Invited Guest Lecturer: An Overview of Genomic Selection in Plant Breeding. In course “Molecular Markers for Breeders”. University of Florida, Gainesville, FL, USA. November 2011

Workshop Instructor: Analysis of Experiments Using ASReml (with emphasis on Breeding Trials). VSN International, Savannah, GA, USA. Sept. 30- Oct 01 2010.

Workshop Instructor: Analysis of Experiments Using ASReml (with emphasis on Breeding Trials). VSN International, Chicago, IL, USA. June 11-12 2010.

Teaching Assistant: Formulation and Projects Evaluation 2003-2004; Accountancy and Finances 2003; Mathematical Methods 2001-2002; System Analysis 2002. Universidad Catolica de Temuco, Chile.

Mentoring:

I. Graduate Students and Post-docs

Graduate students and post-docs in my lab have been successful at obtaining two research grants, eighteen national, state and local awards, and have presented their work twelve times at national and international conferences.

Name	Role	Year	Student	Area of Work
Catherine Cellon	Co-Chair	2015	MSc	Blueberry Breeding
Esteban Rios	Chair	2016	PhD	Ryegrass Breeding
Alexandra Rucker	Chair	2016	MSc	Bermudagrass Breeding
Lin Xing	Co-Chair	2017*	PhD	Complex Trait Analytic
Doug Phillips	Chair	2017*	MSc	Blueberry Anthracnose
Mehul Bhakta	Mentor	2015-2016	Post-Doc	Genomics Polyploids

Luis Inostroza	Mentor	2015-2017*	Post-Doc	Breeding and Genomics
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*Expected

Committee member on ten more UF graduate student committees from the departments of agronomy, animal science, genetics and genomics, plant molecular and cellular biology and horticultural sciences.

II. Interns

I have had three undergraduate and five graduate interns in my lab since 2013. Undergraduates performed an independent project supported by one of my graduate students, while visiting graduate students worked in an independent project under my supervision as part of their dissertations. Most of these projects resulted in scientific products: three national and international poster presentations in scientific meetings, five scientific manuscripts accepted, submitted or in the final stage of preparation, and one software program uploaded to the web:

Rodrigo Amadeu	BSc Student	University of Florida/University of Sao Paulo, Brazil
Mateus Pereira	BSc Student	University of Florida/University of Sao Paulo, Brazil
Gustavo Alves	BSc Student	Federal University of Vicosa, Brazil
Ulisses Figueiredo	PhD. Student	Federal University of Lavras, Brazil
Hugo Ematne	PhD. Student	Federal University of Lavras, Brazil
Fernando Silva	PhD. Student	Universidade Estadual do Norte Fluminense, Brazil
Braulio Moraes	PhD. Student	Federal University of Lavras, Brazil
Paulo Santos	PhD. Student	Universidade Estadual do Norte Fluminense, Brazil

Specialized Training:

May 2012	Programming and computer algorithms with focus on genomic selection in animal breeding. University of Georgia, Athens, Georgia, USA.
Oct 2011	Statistical learning methods for DNA-based prediction of complex traits. Wageningen, The Netherlands.
Sep 2009	Generation of experimental designs with CycDesign. University of Florida, Gainesville, Florida, USA
Mar 2006	Genetics and forest biotechnology. Universidad de Concepcion and NCSU. Concepcion, Chile.

Skills and Languages:

Software: ASReML, R, SAS, CYCDESIGN, ARCVIEW, PERL, JMP, QTL Cartographer and JoinMap

Languages: Spanish (Native Tongue), English (bilingual proficiency) and Portuguese (basic)