María Muñoz-Amatriaín

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[redacted]

EDUCATION

- Ph.D. Molecular and Cellular Biology, Sep 2007, University of Zaragoza, Spain.
  - Dissertation: "Genetic control and transcriptional variation of microspore embryogenesis in barley".
- B.S. Biological Sciences, Jan 2002, University of Salamanca, Spain.

RESEARCH EXPERIENCE

- **Project Scientist,** Department of Botany and Plant Sciences, University of California Riverside, Riverside, California. May 2014–present.
  - Developing genomic resources for barley and cowpea, including reference genome sequences, SNP genotyping platforms and genetic maps.
  - SNP genotyping of breeding materials, and analysis and interpretation of results.
  - Developing, genotyping and phenotyping a mini-core collection of cowpea. Identification of SNPs associated with traits of interest via association genetics (GWAS).
  - Training and supervising undergraduate and graduate students, visiting scientists, and African partners.
- **Courtesy Faculty,** Department of Crop and Soil Science, Oregon State University, Corvallis, Oregon. Oct 2017–present.
- **Research Associate**, Department of Agronomy and Plant Genetics, University of Minnesota, St. Paul, Minnesota, Aug 2008–April 2014.
  - Identification of candidate genes for malting quality improvement in the University of Minnesota barley breeding program.
  - Genetic and functional characterization of a cold-tolerant malting breeding line from the Oregon State University barley breeding program.
  - Development of SNP-based consensus genetic maps for barley.
  - Analysis of copy-number variation in the barley genome.
  - Genetic characterization of the USDA-ARS barley core collection and genome-wide association studies.
- **Visiting Scientist,** Department of Crop and Soil Science, Oregon State University, Corvallis, Oregon, Apr–May, 2013.
- **Visiting Scientist**, The James Hutton Institute (JHI), Dundee, United Kingdom, May–Jun, 2012.
- **Visiting Scientist**, Leibniz Institute of Plant Genetics and Crop Plant Research (IPK), Gatersleben, Germany, Jun–Jul, 2011.
- **Visiting Scientist**, Department of Botany and Plant Sciences, University of California Riverside, Riverside, California, March 2010.

- **Ph.D. Student**, Department of Genetics and Plant Production, Spanish National Research Council (CSIC), Aula Dei Experimental Station, Zaragoza, Spain, Sep 2002–Sep 2007.
  - Identification of genomic regions (QTL) associated with albinism in barley doubled haploid production, and development of markers for marker-assisted selection.
  - Characterization of the gene expression changes accompanying the reprogramming of microspores during microspore embryogenesis.
- **Visiting Student**, Department of Botany and Plant Sciences, University of California Riverside, Riverside, California, Mar–May 2006.
- **Visiting Student**, Department of Botany and Plant Sciences, University of California Riverside, Riverside, California, Sep–Dec, 2004.
- **Visiting Student**, Department of Plant Molecular Genetics, National Center of Biotechnology (CNB), Madrid, Spain, Oct–Dec, 2003.

PUBLICATIONS

1. Lo S, **Muñoz-Amatriaín M**, Boukar O, Herniter I, Cisse N, Guo Y, Roberts PA, Xu S, Fatokun C, Close TJ (2017) Identification of genetic factors controlling domestication-related traits in cowpea (*Vigna unguiculata* L. Walp*). Scientific Reports* (submitted). Also available from *bioRxiv* doi: https://doi.org/10.1101/202044.
2. **Muñoz-Amatriaín M**, Mascher M (2017) Sequence diversity and structural variation. The Barley (*Hordeum vulgare* L.) Genome. Editors: Gary J. Muehlbauer, Nils Stein. *Springer* (submitted).
3. Huynh B, Ehlers JE, **Muñoz-Amatriaín M**, Lonardi S, Santos JR, Ndeve A, Batieno BJ, Boukar O, Cisse N, Drabo I, Fatokun C, Kusi F, Agyare RY, Guo Y, Herniter I, Lo S, Wanamaker SI, Close TJ, Roberts PA (2017) A multi-parent advanced generation inter-cross population for genetic analysis of multiple traits in cowpea *(Vigna unguiculata* L. Walp.). *The Plant Journal* (submitted). Also available from *bioRxiv* doi: https://doi.org/10.1101/149476.
4. Carvalho M, **Muñoz-Amatriaín M**, Castro I, Lino-Neto T, Matos M, Egea-Cortines M, Rosa E, Close TJ, Carnide V (2017) Genetic diversity and structure of Iberian Peninsula cowpeas as compared to world-wide cowpea accessions using a high density SNP array. *BMC Genomics* 18: 891.
5. Mascher M, Gundlach H, Himmelbach A, Beier S, Twardziok S, Wicker T, Radchuk V, Dockter C, Hedley P, Russell J, Bayer M, Ramsay L, Li H, Liu H, Haberer G, Zhang X-Q, Zhang Q, Barrero R, Li L, Taudien S, Groth M, Felder M, Hastie A, Simkova H, Stankova H, Vrana J, Chan S, **Muñoz-Amatriaín M**, Ounit R, Wanamaker S, *et al.* (2017) A chromosome conformation capture ordered sequence of the barley genome. *Nature* 544: 427-433.
6. Mascher M, Gundlach H, Himmelbach A, Beier S, Twardziok S, Wicker T, Radchuk V, Dockter C, Hedley P, Russell J, Bayer M, Ramsay L, Li H, Liu H, Haberer G, Zhang X-Q, Zhang Q, Barrero R, Li L, Taudien S, Groth M, Felder M, Hastie A, Simkova H, Stankova H, Vrana J, Chan S, **Muñoz-Amatriaín M**, Ounit R, *et al.* (2017) Construction of the map-based reference sequence of the barley (*Hordeum vulgare* L.) genome. *Scientific Data* 4.
7. **Muñoz-Amatriaín M,** Mirebrahim H, Xu P, Wanamaker SI, Luo M, Alhakami H, Alpert M, Atokple I, Batieno BJ, Boukar O, Bozdag S, Cisse N, Drabo I, Ehlers JD, Farmer A, Fatokun C, Gu YQ, Guo YN, Huynh BL, Jackson SA, Kusi F, Lawley CT, Lucas MR, Ma Y, Timko MP, Wu J, You F, Roberts PA, Lonardi S, Close TJ (2017) Genome resources for climate-resilient cowpea, an essential crop for food security. *The Plant Journal* 89: 1042-1054.

8. Xu P, Wu X, **Muñoz-Amatriaín M**, Wang B, Wu X, Hu Y, Huynh BL, Close TJ, Roberts PA, Zhou W, Lu Z, Li G (2017) Genomic regions, cellular components and gene regulatory basis underlying pod length variations in cowpea (*V. unguiculata* L. Walp). *Plant Biotechnology Journal* 15: 547-557.

9. Li K, Hegarty J, Zhang C, Wan A, Wu J, Brown-Guedira GL, Chen X, **Muñoz-Amatriaín M**, Fu D, Dubcovsky J (2016) Fine mapping of barley locus *Rps6* conferring resistance to wheat stripe rust. *Theoretical and Applied Genetics* 129: 845–859.

10. Cuesta-Marcos*, **Muñoz-Amatriaín M***, Filichkin T, Karsai I, Trevaskis B, Yasuda S, Hayes PM, Sato K (2015) The relationships between development and low temperature tolerance in barley near isogenic lines differing for flowering behavior. *Plant and Cell Physiology* 56: 2312-2324. *Equally contributing authors.

11. **Muñoz-Amatriaín M***, Lonardi S*, Luo MC, Madishetty K, Svensson JT, Moscou MJ, Wanamaker S, Jiang T, Kleinhofs A, Muehlbauer GJ, Wise RP, Stein N, Ma Y, Rodriguez E, Kudrna D, Bhat PR, Chao S, Condamine P, Heinen S, Resnik J, Wing R, Witt HN, Alpert M, *et al.* (2015) Sequencing of 15,622 gene-bearing BACs clarifies the gene-dense regions of the barley genome. *The Plant Journal* 84: 216-227. *Equally contributing authors.

12. **Muñoz-Amatriaín M**, Cuesta-Marcos A, Endelman JB, Comadran J, Bonman JM, Bockelman HE, Chao S, Russell J, Waugh R, Hayes PM, Muehlbauer GJ (2014) The USDA barley core collection: genetic diversity, population structure, and potential for genome-wide association studies. *PLoS ONE* 9 (4): e94688.

13. **Muñoz-Amatriaín M**, Cuesta-Marcos A, Hayes PM, Muehlbauer GJ (2014) Barley genetic variation: implications for crop improvement. *Briefings in Functional Genomics* 13: 341-350.

14. Hussien A, Tavakol E, Horner DS, **Muñoz-Amatriaín M**, Muehlbauer GJ, Rossini L (2014) Genetics of tillering in rice and barley. *The Plant Genome* 7 (1).

15. **Muñoz-Amatriaín M**, Eichten SR, Wicker T, Richmond TA, Mascher M, Steuernagel B, Scholz U, Ariyadasa R, Spannagl M, Nussbaumer T, Mayer KFX, Taudien S, Platzer M, Jeddeloh JA, Springer NM, Muehlbauer GJ, Stein N (2013) Distribution, functional impact and origin mechanisms of copy number variation in the barley genome. *Genome Biology* 14: R58.

16. Mascher M, Muehlbauer GJ, Rokhsar D, Chapman J, Schmutz J, Barry K, **Muñoz-Amatriaín M**, Close TJ, Wise RP, Schulman AH, Himmelbach A, Mayer KFX, Scholz U, Poland J, Stein N, Waugh R (2013) Anchoring and ordering NGS contig assemblies by population sequencing (POPSEQ). *The Plant Journal* 76: 718-727.

17. Walker CK, Ford R, **Muñoz-Amatriaín M**, Panozzo JF (2013) The detection of QTLs in barley associated with endosperm hardness, grain density, grain size and malting quality using rapid phenotyping tools. *Theoretical and Applied Genetics* 126: 2533–2551.

18. **Muñoz-Amatriaín M,** Moscou MJ, Bhat PR, Svensson JT, Bartoš J, Suchánková P, Šimková H, Endo TR, Fenton RD, Lonardi S, Castillo AM, Chao S, Cistué L, Cuesta-Marcos A, Forrest KL, Hayden MJ, *et al*. (2011) An improved consensus linkage map of barley based on flow-sorted chromosomes and single nucleotide polymorphism markers. *The Plant Genome* 4: 238–249.

19. Sato K, Close TJ, Bhat P, **Muñoz-Amatriaín M,** Muehlbauer GJ (2011) Single nucleotide polymorphism mapping and alignment of recombinant chromosome substitution lines in barley. *Plant and Cell Physiology* 52: 728–737.

20. **Muñoz-Amatriaín M,** Xiong Y, Schmitt MR, Bilgic H, Budde AD, Chao S, Smith KP, Muehlbauer GJ (2010) Transcriptome analysis of a barley breeding program examines gene expression diversity and reveals target genes for malting quality improvement. *BMC Genomics* 11: 653.

21. **Muñoz-Amatriaín M,** Cistué L, Xiong Y, Bilgic H, Budde AD, Schmitt MR, Smith KP, Hayes PM, Muehlbauer GJ (2010) Structural and functional characterization of a winter malting barley. *Theoretical and Applied Genetics* 120: 971–984.

22. **Muñoz-Amatriaín M,** Svensson JT, Castillo AM, Close TJ, Vallés MP (2009) Microspore embryogenesis: assignment of genes to embryo formation and green vs. albino plant production. *Functional and Integrative Genomics* 9: 311–323.

23. **Muñoz-Amatriaín M,** Svensson JT, Castillo AM, Cistué L, Close TJ, Vallés MP (2009) Expression profiles in barley microspore embryogenesis. In: Touraev A, Forster BP, Mohan Jain S (eds) *Advances in haploid production in higher plants.* Springer, NY, pp 127–134.

24. **Muñoz-Amatriaín M,** Castillo AM, Chen XW, Cistué L, Vallés MP (2008) Identification and validation of QTLs for green plant percentage in barley (*Hordeum vulgare* L.) anther culture. *Molecular Breeding* 22: 119–129.

25. Chen XW, Cistué L, **Muñoz-Amatriaín M**, Sanz M, Romagosa I, Castillo AM, Vallés MP (2007) Genetic markers for doubled haploid response in barley. *Euphytica* 158: 287–294.

26. **Muñoz-Amatriaín M,** Svensson JT, Castillo AM, Cistué L, Close TJ, Vallés MP (2006) Transcriptome analysis of barley anthers: effect of mannitol treatment on microspore embryogenesis. *Physiologia Plantarum* 127: 551–560.

ORAL PRESENTATIONS

- **CROPS Conference 2017.** Huntsville, AL (USA). Jun 6, 2017.
  Title: A reference genome sequence of cowpea.
- **ASA, CSSA, and SSSA Annual Meetings, "Resilience Emerging from Scarcity and Abundance".** Phoenix, AZ (USA), Nov 8, 2016.
  Title: Development and characterization of a mini-core collection of cowpea.
- **University of Uruguay, College of Agriculture.** Montevideo (Uruguay). Oct 7, 2016.
  Title: Decoding the genome of cowpea (*Vigna unguiculata*), an essential crop for food security.
- **National Institute of Agricultural Research (INIA) "La Estanzuela".** Colonia (Uruguay). Oct 4, 2016.
  Title: Barley Genome Sequence Resources.
- **Pan-African Grain Legume and World Cowpea Conference.** Livingstone (Zambia). Feb 29, 2016.
  Title: Genome resources for cowpea and their application to West African breeding programs.
- **Yokohama City University.** Yokohama (Japan). Apr 9, 2015.
  Title: Sequencing of 15,622 gene-bearing BACs reveals new features of the barley genome.
- **IBSC MTP Sequencing Workshop.** Gatersleben (Germany), Sep 22, 2014.
  Title: Sequencing and assembly of 15,622 gene-bearing MTP BACs.
- ***Triticeae* CAP Annual Meeting.** San Diego, CA (USA), Jan 13, 2013.
  Title: What have we learned from the genotyping efforts?
- **ASA, CSSA, and SSSA Annual Meetings, "Visions for a Sustainable Planet".** Cincinnati, OH (USA), Oct 21–24, 2012.

Title: Genetic variation in cultivated and non-cultivated barley: from SNPs to copy number variants.

- **Plant and Animal Genome XX Conference, Barley Workshop.** San Diego, CA (USA), Jan 14–18, 2012.
  Title: Frequency and pattern of structural variation in the cultivated and non-cultivated gene-pool of barley as revealed by Comparative Genomic Hybridization.
- **Leibniz Institute of Plant Genetics and Crop Plant Research (IPK).** Gatersleben (Germany), July 21, 2011.
  Title: An improved SNP-based consensus map of barley and first insights into barley intraspecific diversity using CGH.
- **Barley Improvement Conference & Barley Coordinated Agricultural Project Meeting.** San Diego, CA (USA), Jan 11–13, 2011.
  Title: Towards an improved barley SNP map.

POSTER PRESENTATIONS

- **XVI Latin-American Conference of Genetics (ALAG).** Montevideo (Uruguay), Oct 9-12, 2016.
  Title: Advances in cowpea genome resources.
- **Plant and Animal Genome XXIV Conference.** San Diego, CA (USA), Jan 9–13, 2016.
  Title: A genetically-anchored genome assembly for cowpea facilitated by a high-density genotyping array.
- **Plant and Animal Genome XXIII Conference.** San Diego, CA (USA), Jan 10–14, 2015.
  Title: Defining the gene-rich portion of the barley genome.
- **Plant and Animal Genome XXII Conference.** San Diego, CA (USA), Jan 11–15, 2014.
  Title: Genome-wide association studies in the USDA collection of barley cultivars and landraces.
- **Plant and Animal Genome XXI Conference.** San Diego, CA (USA), Jan 12–16, 2013.
  Title: Genetic diversity, population structure and genome-wide association studies in a worldwide barley collection of cultivars and landraces.
- **Plant and Animal Genome XIX Conference.** San Diego, CA (USA), Jan 15–19, 2011.
  Title: Towards a new and improved barley consensus map.
- **Plant and Animal Genome XVIII Conference.** San Diego, CA (USA), Jan 9–13, 2010.
  Title: Transcriptome analysis of a breeding program pedigree reveals target genes for the improvement of malting quality.
- **2nd EMBO Conference on Plant Molecular Biology**, **"Frontiers of Plant Research".** Cadiz, Spain, May 6–9, 2009.
  Title: Key mechanisms underlying barley microspore embryogenesis.
- **VIII Reunión de Biología Molecular de Plantas.** Pamplona, Spain, Jun 28–Jul 1, 2006.
  Title: Embriogénesis gamética en cebada: Análisis del transcriptoma de tres líneas tras el tratamiento de estrés.
- **VI Reunión de la Sociedad Española de Cultivo *In Vitro* de Tejidos Vegetales.** Cordoba, Spain, Sep 12–13, 2005.
  Title: Inducción de la embriogénesis gamética: Análisis mediante *DNA microarrays* de cebada.
- **V Reunión de la Sociedad Española de Cultivo *In Vitro* de Tejidos Vegetales.** Pamplona, Spain, Jun 29–Jul 2, 2003.
  Title: Análisis de la estabilidad genética de las líneas obtenidas por cultivo de anteras de cebada.

GRANTS, FELLOWSHIPS AND AWARDS

- **NSF BREAD Grant #1543963**: "Advancing the Cowpea Genome for Food Security" ($1,587,345). Apr 2016 – Mar 2019. Role: Co-PI.
- **The Microbial and Plant Genomics Institute (MPGI) Travel Award,** $800 in partial support to attend the Plant and Animal Genome XXII Conference, Jan 2014, Jan 2011 & Jan 2010.
- **Spanish Ministry of Education and Science** Fellowship for Ph.D. students, ~ $70,000 to complete the Ph.D. program at the Department of Genetics and Plant Production, Aula Dei Experimental Station (CSIC), Zaragoza (Spain), 2002–2006.
- **Spanish Ministry of Education and Science** Short-Term Fellowship, $4,000 to fund the visit to Timothy Close Lab, University of California Riverside, Mar–May 2006.
- **Spanish Ministry of Education and Science** Short-Term Fellowship, $6,000 to fund the visit to Timothy Close Lab, University of California Riverside, Sep–Dec 2004.
- **Spanish Ministry of Education and Science** Short-Term Fellowship, $4,000 to fund the visit to Salome Prat Lab, Centro Nacional de Biotecnologia (CNB), Oct–Dec 2003.
- **Spanish Ministry of Education** Mobility Grant, $20,000 in partial support to study at the University of Salamanca, 1996–2002.

TEACHING, SUPERVISION AND ADVISING ACTIVITIES

- **Teaching Activities:**
  - Instructor of the graduate course "Genomic tools and resources for crop breeding" (3 credits). University of Uruguay, Montevideo (Uruguay). Oct 5-7, 2016.
  - Instructor of the course "Herramientas genomicas para el mejoramiento de especies de interes productivo". XVI Latin-American Conference of Genetics (ALAG), Montevideo (Uruguay). Oct 9, 2016.
  - Instructor of workshop session "iSelect SNP data analysis from West African accessions". Cowpea Modern Breeding Workshop**.** University of California Riverside, CA (USA), Mar 23-27, 2015.
- **Supervision and Advising Activities:**
  - Javier Hernandez Vasquez: Graduate student at Oregon State University, Aug 2017-present.
  - Ira Herniter: Graduate student at the University of California Riverside, Sep 2015-present.
  - Sassoum Lo: Graduate student at the University of California Riverside, Jun 2014-present.
  - Muhammad Lawan Umar: Visiting scientist from Institute for Agricultural Research (IAR) in Nigeria, Jun-Jul 2017.
  - Felicien Zida: Visiting scientist from Institut de l'Environnement et de Recherches Agricoles (INERA) in Burkina Faso, Jan-Feb 2017.
  - Marcia Carvalho: Visiting graduate student from the University "Tras-Os-Montes e Alto Douro" in Portugal. Mar-Jun 2016.
  - Richard Agyare: Visiting scientist from The Savanna Agricultural Research Institute (SARI) in Ghana, Mar-Sep 2016.
  - Alex Rajewski: Rotating graduate student at the University of California Riverside, Sep-Oct 2015.

- Pei Xu: Visiting associate professor from the Zhejiang Academy of Agricultural Sciences (ZAAS) in China, Nov-Dec 2014.
- Brian Rhodes: Undergraduate at the University of Minnesota, 2014.
- Margie Stringfield: Summer intern with the USDA-funded TCAP project, 2013.
- Joshua Sleper: UROP–awarded undergraduate at the University of Minnesota, 2011-2012.

ADDITIONAL INFORMATION

- **Volunteer** at the UC Riverside Community Garden (R'Garden). Feb 2017–present.
- **Reviewer** for Theoretical and Applied Genetics, BMC Genomics, Scientific Reports, PLoS One, International Journal of Molecular Sciences, Genes, Genomes, Genetics (G3), and Journal of Agriculture and Ecology Research International.
- **Reviewer** of grant proposals for the Natural Sciences and Engineering Research Council of Canada.
- **Participant** in the **hfp Leadership and Management Skills Course**, sponsored by the Bill and Melinda Gates Foundation. Sep 29-Oct 1, 2017.
- **Spoken languages**: Spanish (native), English (fluent), and Italian (beginner).