

Curriculum vitae – PATRICIO GRASSINI

Department of Agronomy & Horticulture, University of Nebraska-Lincoln
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Current position:

Associate Professor (tenured), Dept. of Agronomy & Horticulture, Univ. of Nebraska-Lincoln (UNL),
<http://agronomy.unl.edu/grassini>

Areas of expertise:

Agricultural systems, Yield potential, Yield gaps, Resource-use efficiency, Crop physiology, Modeling

Program overview:

Meeting demand for food, feed, fiber, and fuel in a world with a population of 9.8 billion people by 2050, without negative environmental impact or unsustainable use of natural resources, is one of the greatest scientific challenges of our time. Sustainable crop intensification on existing cropland area is therefore crucial to meet increasing food demand and relieve the pressure on cropland expansion. My research and extension programs focus on narrowing the existing yield gap between potential yields and current farm yields, while improving resource-use efficiency and producer profit and minimizing environmental footprint. My program leverages from expertise on crop modeling, spatial analysis, big data, and hypothesis-driven field experiments to benchmark productivity and environmental footprint of crop systems and to identify opportunities for improving both. My program aligns with IANR goals relative to address priority issues facing Nebraska's agriculture and food industries, provide the knowledge base essential for managing our natural resources, promote family well-being and community development, and educate future scientists. My research promoting sustainable crop intensification goes beyond Nebraska, including rainfed crops in Argentina and Sub-Saharan Africa, high-yield irrigated crops in the U.S. Corn Belt and South-East Asia, and perennial crop systems such as oil palm in Indonesia. A major on-going project is to develop a Global Yield Gap and Water Productivity Atlas (www.yieldgap.org) that provides estimates of gaps between actual and potential yield for major cropping systems as well as crop water productivity. Another major project is on identifying solutions for improving productivity of smallholder oil palm farmers in Indonesia as a way to meet production goals while preserving rainforests and peatlands in this country. My program is strong at publishing scientific articles in top-tier journals, such as *Nature Communications*, *Nature Sustainability*, *PNAS*, *Environmental Research Letters*, and *Plant Cell & Environment*, and at delivering practical information to farmers, crop consultants, and industry to support management, logistics, and marketing decisions. My program has secured external funding at a level of 12 million USD since the start of my position as faculty at UNL. In recognition to these outputs, I have been invited to deliver presentations as keynote speaker at seven international conferences, received numerous awards for my research and extension accomplishments, and served as reviewer for USDA and AAAS competitive grant programs and as member of the editorial board for two scientific journals. I have also been included in the Web of Science's 2019 List of Highly Cited Researchers (top 1% in the discipline and year in the world).

Education:

PhD. (Agronomy). UNL (2010). Advisor: Dr Kenneth G Cassman. GPA: 3.9/4

BS (Agricultural Engineer). Univ. Buenos Aires (UBA), Argentina (2005). 5-year program. GPA: 9.02/10

Previous positions:

Assistant Professor (tenure-track position), UNL (2014-2017)

Assistant Research Professor (non-tenure track position), UNL (2011-2013)

Post-Doctoral Research Associate, UNL (2010)

Scholarships:

UNL Fling Fellowship (2009-2010), Fulbright Scholarship (2007-2009), Mosoteguy Scholarship (2004)

Honors and Awards:

W.L. Nelson Award for Diagnosing Yield-Limiting Factors, Agronomy Society of America (ASA) (2020)
List of Highly Cited Researchers (top 1% in the discipline and year in the world). Web of Science (2019)
Agronomy Society of America (ASA) Early Career Award (2016)
Junior Faculty Excellence in Research Award. UNL (2015)
Fellow of Water for Food Institute (since Nov 2013) & Center for Great Plains Studies (since Feb 2015)
Blue Ribbon Award, Educational Aids Competition, ASABE (2013)
Widaman Distinguished Graduate Assistant Award. UNL (2009)
Gerald O. Mott Meritorious Graduate Student Award in Crop Science. ASA (2009)
William J. Curtis Endowed Fellowship. UNL (2007)
Diploma of Honor. UBA (2006)

Professional societies:

Gamma Sigma Delta (GSA), Nebraska chapter (2016-present)
Agronomy Society of America, Crop Science Society of America, Soil Society of America (2007-present)

Research grants (and total amount for the funding period—total: 12 million USD):

2020-2021	Minimum data collection strategy, International Fertilizer Association (PI)	\$35,000
2019-2023	<i>Oil palm Intensification</i> , Norwegian Ministry of Foreign Affairs (PI)	\$4,228,819
2019-2021	<i>Yield gaps in Canada</i> , Canadian Agriculture Funding Consortium (partner)	\$320,000
2019-2020	<i>Yield gap atlas for Brazil</i> , IPNI + SPRINT program (PI)	\$35,000
2019-2021	<i>Soybean quality in Nebraska</i> , NSB (PI)	\$160,000
2019-2020	<i>Boots on the ground-soybean benchmarking</i> , NCSRP (PI)	\$1,346,564
2018-2019	<i>An oil palm yield gap atlas</i> , Norwegian Ministry of Foreign Affairs (PI)	\$220,000
2018-2019	<i>Integrating remote sensing with farmer data</i> , NSB (PI)	\$45,000
2018-2020	<i>A platform for N benchmarking</i> , USDA NIFA (PI)	\$450,000
2017-2018	<i>Developing GYGA Indonesia</i> , DWFI (PI)	\$50,000
2017-2018	<i>Assessing variation on grain nitrogen</i> , EDF (PI)	\$13,000
2016-2017	<i>Developing GYGA-IMPACT</i> , CGIAR-CIMMYT (PI)	\$92,000
2016-2018	<i>Assessing fertilizer gaps</i> , CGIAR-CCAFS (Partner)	\$71,300
2016-2018	<i>Benchmarking input-efficiency of corn systems</i> , NE Corn Board (PI)	\$255,000
2016-2017	<i>Developing spatial frameworks</i> , Environmental Defense Fund (PI)	\$45,000
2015-2018	<i>Benchmarking soybean in North Central US</i> , NCSRP (PI)	\$1,338,612
2015-2018	<i>Benchmarking soybean production in NE</i> , NE Soybean Board (PI)	\$22,500
2014-2017	<i>High-yield soybean</i> , NE Soybean Board, (PI)	\$195,000
2013-2014	<i>Benchmarking corn-based systems in Nebraska</i> , NE Corn Board (PI)	\$127,600
2013-2014	<i>Developing CornSoyWater</i> . NE Energy Science Research (Collaborator)	\$122,000
2011-2014	<i>Global yield gap atlas</i> , Bill & Melinda Gates Foundation (Investigator)	\$3,284,324

Publication summary:

h-index: 34; i10-index: 54; total citations: 5,450 (by Aug 15, 2020; checked with Google Scholar®)
Scientific publications: 72 refereed journal articles and 10 book chapters & FAO technical reports
Two licenses: Hybrid-Maize (<http://hybridmaize.unl.edu>) & TEDs (<http://nutrientstar.org/ted-framework/>)
One website (Global Yield Gap Atlas, www.yieldgap.org) receiving, on average, 125,000 views per year.

Selected (50) publications:

Grassini P, Yang HS, Cassman KG. 2009. Limits to maize productivity in the Western Corn-Belt: A simulation analysis for fully irrigated and rainfed conditions. *Agricultural and Forest Meteorology* 149:1254-1265.

Grassini P, Hall AJ, Mercau JL, 2009. Benchmarking sunflower water productivity in semiarid environments. *Field Crops Research* 110:251-262.

Grassini P, You J, Hubbard K, Cassman KG. 2010. Soil water recharge in a semi-arid temperate climate of the Central U.S. Great Plains. *Agricultural Water Management* 97:1063-1069.

- Grassini P**, Thornburn J, Burr C, Cassman KG. 2011. High-yield irrigated maize in the Western U.S. Corn Belt: I. On-farm yield, yield potential, and impact of agronomic practices. *Field Crops Research* 120:144-152.
- Grassini P**, Cassman KG, 2012. High-yield maize with large net energy yield and small global warming intensity. *Proceedings of the National Academy of Sciences (PNAS)* 109:1074-1079.
- Van Wart J, Van Bussel LGJ, Wolf J, Licker R, **Grassini P**, Nelson A, Boogaard H, Gerber J, Mueller ND, Claessens L, Cassman KG, Van Ittersum MK. 2013. Reviewing the use of agro-climatic zones to upscale simulated crop yield potential. *Field Crops Research* 143:44-55
- Cassman KG, **Grassini P**, 2013. Can there be a green revolution in Sub-Saharan Africa without large expansion of irrigated crop production? *Global Food Security* 2:203-209.
- Grassini P**, Eskridge K, Cassman KG, 2013. Distinguishing between yield advances and yield plateaus in historical crop production trends. *Nature Communications* 4, 2918
- Van Wart J, **Grassini P**, Cassman KG, 2013. Impact of derived global weather data on simulated crop yields. *Global Change Biology* 19:3822-3834.
- van Ittersum MK, Cassman KG, **Grassini P**, Wolf J, Tittone P, Hochman Z, 2013. Yield gap analysis with local to global relevance – a review. *Field Crops Research* 143:4-17
- Sibley AM, **Grassini P**, Thomas NE, Cassman KG, Lobell DB, 2014. Testing remote sensing approaches for assessing yield variability among maize fields. *Agronomy Journal* 106:24-32
- Grassini P**, Torrión JA, Cassman KG, Yang HS, Specht JE, 2014. Drivers of spatial and temporal variation in soybean yield and irrigation requirements. *Field Crops Research* 163:32-46
- Bassu S, Brisson N, Durand J-L, Boote K, Lizaso J, Jones JW, Rosenzweig C, S, **Grassini P**, et al. 2014. How do various maize crop models vary in their responses to climate change factors? *Global Change Biology* 20:2301-2320.
- Grassini P**, Specht J, Tollenaar T, Ciampitti I, Cassman KG, 2014. High-yield maize-soybean cropping systems in the U.S. Corn Belt. In: Crop Physiology- Applications for genetic improvement and agronomy (2nd edition), Sadras VO, Calderini DF (Eds.) Elsevier, Netherlands.
- van Bussel LGJ, **Grassini P**, Van Wart J, Wolf J, Claessens L, Yang H, Boogaard H, de Groot H, Saito K, Cassman KG, Van Ittersum MK, 2015. From field to atlas: Upscaling of location-specific yield gap estimates. *Field Crops Research* 177:98-108
- Van Wart J, **Grassini P**, Yang HS, Claessens L, Jarvis A, Cassman KG, 2015. Creating long-term weather data from thin air for crop simulation modelling. *Agricultural and Forest Meteorology* 208:49-58.
- Grassini P**, Torrión JA, Yang HS, Rees J, Andersen D, Cassman KG, Specht JE, 2015. Soybean yield gaps and water productivity in the western U.S. Corn Belt. *Field Crops Research* 179:150-163.
- Grassini P**, Van Bussel LGJ, Van Wart J, Wolf J, Claessens L, Yang H, Boogaard H, de Groot H, Van Ittersum MK, Cassman KG, 2015. How good is good enough? Data requirements for reliable crop yield simulations and yield-gap analysis. *Field Crops Research* 177:49-63.
- Aramburu Merlos F., Monzon JP, Mercau JL, Taboada, M, Andrade, FH, Hall AJ, Jobbagy E, Cassman KG, **Grassini P**, 2015. Potential for crop production increase in Argentina through closure of existing yield gaps. *Field Crops Research* 184:145-154
- Marin F, Martha G, Cassman KG, **Grassini P**, 2016. Prospects for increasing sugarcane and bioethanol production on existing crop area in Brazil. *BioScience* 66:307-316.
- Farmaha BS, Lobell DB, Boone K, Cassman KG, Yang, SH, **Grassini P**, 2016. Contribution of persistent factors to yield gaps in high-yield irrigated maize. *Field Crops Research* 186:124-132.
- Morell FJ, Yang HS, Cassman KG, Van Wart J, Elmore RW, Licht M, Coulter JA, Ciampitti IA, Pittelkow CM, Brouder SM, et al, **Grassini P**, 2016. Can crop simulation models be used to predict local to regional maize yields and total production in the U.S. Corn Belt? *Field Crops Research* 192:1-12.
- Zanon AJ, Steck NA, **Grassini P**, 2016. Climate and management factors influence soybean yield potential in a subtropical environment. *Agronomy Journal* 108:1-8.
- van Ittersum MK, van Bussel LGJ, Wolf J, **Grassini P**, van Wart J, Guilpart N, et al., 2016. Can sub-Saharan Africa feed itself? *Proceedings of the National Academy of Sciences (PNAS)* 113:14964-69
- Farmaha BS, Eskridge KM, Cassman KG, Specht JE, Yang H, **Grassini P**, 2016. Rotation impact on on-farm yield and input-use efficiency in high-yield irrigated maize-soybean systems. *Agronomy Journal* 108:1-9.

- Grassini P**, Pittelkow CM, Cassman KG, Yang HS, Archontoulis S, Licht M, Lamkey KR, Ciampitti IA, Coulter JA, Brouder SM, Volenec JJ, Guindin-Garcia N, 2017. Robust spatial frameworks for leveraging research on sustainable crop intensification. *Global Food Security* 14:18-22.
- Guilpart N, **Grassini P**, Sadras VO, Timsina J, Cassman KG, 2017. Estimating yield gaps at the cropping system level. *Field Crops Research* 206, 21-32.
- Tenorio FM, Specht JE, Arkebauer TJ, Eskridge KM, Graef GL, **Grassini P**, 2017. Co-ordination between primordium formation and leaf appearance in soybean (*Glycine Max*) as influenced by temperature. *Field Crops Research* 210:197-206
- Guilpart N, **Grassini P**, Van Wart J, Yang H, van Ittersum M, van Bussel L, Wolf J, Claessens L, Leenars J, Cassman KG, 2017. Rooting for Food Security in Sub-Saharan Africa. *Environmental Research Letters* 12:114036.
- Rattalino Edreira JI, Mourtzinis S, Conley SP, Roth A, Ciampitti IA, Licht MA, Kandel H, Kyveryga PM, Lindsey LE, Mueller DS, et al, **Grassini P**, 2017. Assessing causes of yield gaps in agricultural areas with diversity in climate and soils. *Agricultural and Forest Meteorology* 247:170-180.
- Cafaro La Menza N, Monzon JP, Specht J, **Grassini P**, 2017. Is soybean yield limited by nitrogen supply? *Field Crops Research* 213:204-212.
- Rattalino Edreira JI, Cassman KG, Hochman Z, van Ittersum MK, van Bussel L, Claessens L, **Grassini P**, 2018. Beyond the plot: Technology extrapolation domains for scaling out agronomic science. *Environmental Research Letters* 13:054027
- Mourtzinis S, Rattalino Edreira JI, **Grassini P**, et al, 2018. Sifting and winnowing: Analysis of farmer field data for soybean in the US North-Central region. *Field Crops Research* 221:130-141.
- Rizzo G, Rattalino Edreira JI, Archontoulis SV, Yang HS, **Grassini P**, 2018. Do shallow water tables contribute to high and stable maize yields in the US Corn Belt? *Global Food Security* 18:27-34.
- Rattalino Edreira, Guilpart N, Sadras V, Cassman KG, van Ittersum MK, Schils RLM, Grassini P, 2018. Water productivity of rainfed maize and wheat: a local to global perspectives. *Agricultural and Forest Meteorology* 259:364-373.
- Andrade JF, Rattalino Edreira JI, Farrow A, van Loon MP, Craufurd PQ, Rurinda J, Zingore S, Chamberlin J, Claessens L, Adewopo J, van Ittersum MK, Cassman KG, **Grassini P**, 2019. A spatial framework for ex-ante impact assessment of agricultural technologies. *Global Food Security* 20:72-81
- Deng N, **Grassini P**, Yang H, Huang J, Cassman KG, Peng S, 2019. Closing yield gaps for rice self-sufficiency in China. *Nature Communications* 10:1725.
- Andrade JF, Rattalino Edreira JI, Mourtzinis S, Conley SP, Ciampitti IA, Dunphy JE, Gaska JM, Glewen K, Holshouser DL, Kandel HJ, et al., **Grassini P**, 2019. Assessing the influence of row spacing on soybean yield using experimental and producer survey data. *Field Crops Research* 230:98-106.
- Gibson KEB, Gibson J, **Grassini P**, 2019. Benchmarking irrigation water use in producer fields in the US Central Great Plains. *Environmental Research Letters* 14:054009.
- Agus F, Andrade J, Rattalino Edreira JI, Deng N, Purwantomo D, Agustiani N, Aristya V, Batubara S, Herniwati H, Evert H, Krisnadi L, et al, **Grassini P**, 2019. Yield gaps in intensive rice-maize sequences in the humid tropical environment of Indonesia. *Field Crops Research* 237:12-22.
- Azzari G, **Grassini P**, Rattalino Edreira JI, Conley S, Mourtzinis S, Lobell DB, 2019. Satellite mapping of tillage practices in the U.S. Corn Belt since 2007. *Remote Sensing of Environment* 221:417-429.
- Yuan S, Cassman KG, Huang J, Peng S, **Grassini P**, 2019. Can ratoon cropping improve resource use efficiencies and profitability of rice in central China? *Field Crops Research* 234:66-72
- Tenorio FA, Eagle A, McLellan E, Cassman K, Howard R, Below F, Clay D, Coulter J, Geyer A, Joos D, et al, **Grassini P**, 2019. Assessing variation in maize grain nitrogen concentration and its implications for estimating nitrogen balance in the US North Central region. *Field Crops Research* 240:185-193.
- Rattalino Edreira JI, Mourtzinis S, Azzari G, Andrade JF, Conley SP, Specht JE, **Grassini P**, 2020. Combining field-level data and remote sensing to understand impact of management practices on producer yields. *Field Crops Research* 257:107932.
- Cafaro La Menza N, Monzon JP, Lindquist JL, Arkebauer TJ, Knops JMH, Unkovich M, Specht JE, **Grassini P**, 2020. Insufficient nitrogen supply from symbiotic fixation reduces seasonal crop growth and nitrogen mobilization to seed in highly productive soybean crops. *Plant Cell & Environment* 43: 1958-1972.

Mourtzinis S, **Grassini P**, Rattalino Edreira JI, Andrade J, Kyveryga P, Conley S, 2020. Assessing approaches for stratifying producer fields based on biophysical attributes for regional yield-gap analysis. *Field Crops Research* 254:107825.

Cassman KG, **Grassini P**, 2020. A global perspective of sustainable intensification research. *Nature Sustainability* 3:262-268.

Tenorio FAM, McLellan EL, Eagle AJ, Cassman KG, Andersen D, Krausnick M, Oaklund R, Thorburn J, **Grassini P**, 2020. Benchmarking impact of nitrogen inputs on grain yield and environmental performance of producer fields in the western US Corn Belt. *Agriculture, Ecosystems and Environment* 194:106865.

Rattalino Edreira JI, Mourtzinis S, Azzari G, Andrade JF, Conley SP, Lobell D, Specht JE, **Grassini P**, 2020. From sunlight to seed: Assessing limits to solar radiation capture and conversion in agro-ecosystems. *Agricultural and Forest Meteorology* 280:107775.

Grassini P, Cafaro La Menza N, Rattalino Edreira JI, Tenorio FA, Monzon JP, Specht JE, 2020. Soybean. *In: Crop Physiology of Major Crops* (Calderini & Sadras Eds). Elsevier, The Netherlands.

Mourtzinis S, Andrade JF, **Grassini P**, Rattalino Edreira JI, Kandel H, Naeve S, Nelson K, Helmers M, Conley SP, 2021. Assessing benefits of artificial drainage on soybean yield in the North Central US region. *Agricultural Water Management* 243:106425.

Keynote speaker:

XX Brazilian Society of Agrometeorology Conference (CBAAGRO). Petrolina, Brazil (2017).
 Global Land Program Open Science Meeting (GPL-OSM), Berne, Switzerland (2019).
 XXI Brazilian Society of Agrometeorology Conference (CBAAGRO). Catalao, Brazil (2019).
 19th Australian Agronomy Conference, Wagga Wagga, Australia (2019).
 International Conference on Agric, Env, and Food Security (ICAEF). Medan, Indonesia (2019).
 1st International Conference on Sustainable Tropical Land Management. Jakarta, Indonesia (2020)
 8th International Crop Science Congress, Saskatoon, Canada (postponed to 2021).

Professional service:

Chair of the Crop Science Society of America C3 Division on Crop Ecology (2018)
 Member of Science Advisory Council for *Field to Market* (2016-present)
 C2 Division Representative for C536.1 CSSA Rapid Response Team Committee (2014-present)
 Member of the Editorial Board of *Field Crops Research* and *Global Food Security* journals
 Served in four graduate advisory committees and numerous A&H Dept and UNL Senate committees.
 Panel reviewer for the AAAS Research Competitiveness Program (2017)
 Panel reviewer for USDA-AFRI Foundational and Applied Science program (2020)

Teaching/Advising:

Graduate course on “Yield potential and yield gap in annual crops”. University Federal of Santa Maria, Brazil (2019)
 Advisor of five grad students, eight post-docs, two research assistant professors, and 10 visiting scholars.
 Invited lecturer in Agroecology, AGRO435/835, UNL (2016-present)
 On-line class ‘Nutrient requirements in high-yield crops’, AGRO366, UNL (2011)

Extension activities:

Real-time corn yield forecasts for +40 sites across US North Central region, leading a team of experts from 10 universities and UNL extension, providing farmers, consultants, and industry with data to inform management, logistics, and marketing decisions. Associated articles received *ca.* 10,000 views per year.
 See: <https://cropwatch.unl.edu/2020/2020-corn-yield-forecasts-approach-and-interpretation-results>
 Presenter at extension events sponsored by UNL, Nebraska Natural Resources Districts (NRDs), industry, and other universities (total: +10 per year)
 Extension publications: 20 articles, 5 Crop Clinics Proceedings, and +70 UNL CropWatch