December 2022

CURRICULUM VITAE

• **Personal Details**

Name: Ilya (Ilia) Gelfand
Work address: Jacob Blaustein Institutes for Desert Research, French Associates Institute for Agriculture and Biotechnology of Drylands
Ben-Gurion University of the Negev
Tel.: +972-8-6563482
Web of Science ResearcherID: AAT-1776-2020
ORCiD: 0000-0002-8576-0978
GoogleScholar: https://scholar.google.com/citations?user=tDCTZBcAAAAJ&hl=en
Fluent in English, Hebrew, and Russian

• **Education**

B.Sc. - 1995-1999, Hebrew University of Jerusalem, Biology and Environmental Studies
M.Ag.Sc. - 1999-2002, Hebrew University of Jerusalem, The Department of Animal Sciences
Name of advisor: Prof. Jaap van Rijn
Title of thesis: “Study of nutrient transformations in a zero-discharge mariculture recirculating system with emphasis on sulfide oxidation”.
Ph.D.- 2002-2008, Weizmann Institute of Science, The Department of Environmental Sciences and Energy Research
Name of advisor: Prof. Dan Yakir
Title of thesis: "Factors controlling availability and dynamics of nitrogen in a semiarid forest ecosystem".

• **Employment History**

2017 – current, Senior Lecturer, French Associates Institute for Agriculture and Biotechnology of Drylands, The Jacob Blaustein Institutes for Desert Research. Ben-Gurion University of the Negev.
2013 – 2017 Sr. Research Associate, Michigan State University, Kellogg Biological Station and DOE Great Lakes Bioenergy Research Center, Hickory Corners. MI. USA
2008 – 2013, Postdoctoral Research Associate, Michigan State University, Kellogg Biological Station and DOE Great Lakes Bioenergy Research Center, Hickory Corners. MI. USA

• **Professional Activities (asterisk * denoting activities since appointment at BGU)**

(b) <u>Professional functions outside universities/institutions (* - since appointment at BGU)</u>
*2018 - current, Member of the Board of Soil Sciences Society of Israel. Israel
2012 - 2017, Information management committee KBS Long-Term Ecological Research. Michigan State University. MI, USA
2010 - 2011; Development of new Long-Term Ecological Research network data portal. Data usability, search, and interface team. USA
(c) <u>Member of Editorial board and Editorial advisory board</u>
*2020 - current, Ecological Processes - Associate Editor

2016 - current, GCB Bioenergy - Editorial Advisory Board

(d) Ad-hoc reviewer for journals

Regularly performing review for ~15 peer review journals including *Agriculture, Ecosystems, and Environment*, *Biogeochemistry, BioScience, Environmental Science & Technology, GCB-Bioenergy, JGR-Biogeosciences, Nature, SSSAJ*. Average of one - two manuscripts per month.

Ad-hoc reviewer for grant-making agencies

SEEDS proposals for Ohio State University (USA; 2014, 2015); Discovery Grant proposals for NSERC (Canada; 2015); USA NSF-DEB pre-proposal panel (2016); *BARD (2017); *USA NSF-DEB proposal panel (2020).

(e) Membership in professional/scientific societies

*2019 – current, Soil Science Society of America.

*2017 – current, Soil Science Society of Israel.

2009 – current, American Geophysical Union (expert contact for media in areas of climate change (AGU 2009) and renewable energy (AGU 2015); OSPA judge (AGU 2011)

2008-2014; 2022 – current, Ecological Society of America.

2007 – current, European Geophysical Union.

• **Educational activities**

(a) Courses taught (* - since appointment at BGU)

*2020 – current, Terrestrial Biogeochemistry, Jacob Blaustein Institutes for Desert Research. 3 credits, Graduate level. First term.

*2020 – current. Guided Reading on Ecosystem Ecology and Biogeochemistry. 2 credits, Graduate level. First and second terms.

*2019 – current, Energy and Environment, 82612, Department of Geography and Environmental Development, BGU. 3 credits. Second term.

*2018 - 2021, Sustainable Agricultural Solutions, International course with support from the VATAT (ICHE). 30 international students from India, China, Russia, and USA. Yearly during summer for four weeks.

2014 - Co-instructor, CSS 424 SAFS. Sustainable Agriculture and Food Systems: Integration and Synthesis, MSU. 17 students, 3 credits. MSU (upper level).

Guest lecturer, ZOL 355 Ecology (Introduction to Elemental Cycling), MSU.

2013 - Guest lecturer, CSS 442 Agricultural Ecology (Biofuels sustainability), MSU.

2011-2013 - Guest lecturer, International Biofuels Short Course. MSU.

2000-2002 - Teaching Assistant, Hebrew University of Jerusalem.

Courses taught:

Microbial Ecology of Fish Culture Systems (Bachelor's degree level); Water Quality Assessment in Aquaculture Systems (Master's and Doctorate level); Introduction to Animal Biology (Bachelor's degree level).

(b) Research students

M. Sc. (2018 - now):

1. Minikaev Daniel (2018-2020; Nitrogen cycling in the date palms plantation).
2. Yagle Isaac (2018-2020; together with Dr. Segoli; Effect of *Salsola sp*. on soil N cycle).
3. Shrestha Ram Chandra (2018-2020, together with Prof. Khozin-Goldberg; Effect of biofertilization on environmental footprint of wheat farming in Israel).

4. Lumor Elided J. (2019- 2021, Effect of increasing N fertilization on environmental performance and yield of carrot farming).
5. Martha Osei-Yeboah (2020 - 2022, together with Prof. Agam; NutNet).
6. Vanessa Joseph Victor Benjamin (2021 - current)
7. Chris Mwangi Gathaiya (2022-current)
8. Pavithra Basigeri (2022-currnet)

Ph.D. candidates (2020 - now):
1. Yagle Isaac (Ecosystem Ecology).
2. Martha Osei-Yeboah (Ecosystem Ecology).

Postdoc (2020 - now):
1. Edwige Demangeat
2. Erick Wilkman

Undergraduate research interns; (* - since appointment at BGU)

2012 - Cait Gallagher (UIUC) - Undergraduate research intern: "Influence of soil trace gas emissions on plant productivity", MSU.

2013 - Brigitte Cecelia Garo Moneymaker (SUNY) - Undergraduate research intern: "Plant productivity, soil N mineralization and NO_x emissions", MSU.

2014 - Michele Lozano (NAU) - Undergraduate research intern: "Plant productivity and NO emissions", MSU.

2015 - Richard Moyer (Albright College) and Asia Poe (MSU) - Undergraduate research interns: "The difference is like day and night: diurnal patterns of soil greenhouse gas emissions", MSU.

*2018 – Doron Pinko (BGU) - Undergraduate research intern: "Measurement of GHG emissions from soils using static chamber", BGU.

*2019 – Samantha Angeline (Drexel University, USA) - Undergraduate research intern: "Finding the right algal fertilization mix", BGU.

*2019 – Gali Halpern (BGU) - Undergraduate research intern: "Environmental impact of dates plantation", BGU.

• **Awards, Citations, Honors, Fellowships**

2002-2008, Weizmann Institute of Science, Full Doctoral fellowship

2007, European Science Foundation (ESF), Stable Isotopes in Atmosphere – Biosphere Exchange. Accommodation, travel, and course costs "Stable Isotopes in Ecology"; *Vienna University*, Vienna, Austria.

2015 - National Science Foundation USA (NSF) BIO-OCE REU Mentor-Student Travel Scholarship (with Richard Moyer); $3000.

• **Scientific Publications**

a) H-index: Web of Science (ISI) - 19, Google Scholar - 22

b) Total number of citations of all articles: ISI - 1458, Google Scholar - 2236.

c) Total number of citations without self-citations: ISI - 1374; Average per paper 50.43.

Refereed articles and refereed letter in scientific journals, running numbers; (* - since appointment at BGU). S-student, **S**-student advised by me, C-collaborator, T-technician, PD-postdoc, PI-principal investigator.

1) Cytryn[S] E, **Gelfand[S] I**, Barak[S] Y, van Rijn[PI] J, Minz[PI] D. (2003) Diversity of microbial communities correlated to physiochemical parameters in digestion basin of a zero-discharge mariculture system. *Environmental Microbiology 5(1): 55-63*. (59 citations; IF 5.476; 47/137; Q2)
2) Barak[S] Y, Cytryn[S] E, **Gelfand[S] I**, Krom[C] M, van Rijn[PI] J. (2003) Phosphorus removal in a marine prototype recirculating aquaculture system. *Aquaculture 220(1-4):313-326*. (111 citations; IF 5.135; 5/54; Q1)
3) **Gelfand[S] I**, Barak[S] Y, Even-Chen[S] Z, Cytryn[S] E, Krom[C] M, Neori[C] A, van Rijn[PI] J. (2003) A novel zero-discharge intensive seawater recirculating system for the culture of marine fish. *Journal of the World Aquaculture Society 34 (3): 344-358*. (95 citations; IF 3.402; 12/54; Q1)
4) Cytryn[S] E, Minz[PI] D, **Gelfand[S] I**, Neori[C] A, Gieseke[PD] A, de Beer[PI] D, van Rijn[PI] J. (2005) Sulfide-oxidizing activity and bacterial community structure in a fluidized bed reactor from a zero-discharge mariculture system. *Environmental Science & Technology 39(6): 1802-1810*. (57 citations; IF 11.357; 8/54; Q1)
5) Grünzweig[PI] JM, **Gelfand[S] I**, Fried[S] Y, Yakir[PI] D. (2007) Biogeochemical factors contributing to enhanced carbon storage following afforestation of a semi-arid shrubland. *Biogeosciences 4: 891-904*. (140 citations; IF 5.092; 37/173; Q1)
6) **Gelfand[S] I** and Yakir[PI] D. (2008) Influence of nitrite accumulation in association with seasonal patterns and mineralization of soil nitrogen in a semi-arid pine forest. *Soil Biology & Biochemistry 40: 415-424*. (113 citations; IF 8.546; 2/39; Q1)
7) **Gelfand[S] I**, Feig[S] G, Meixner[PI] FX, Yakir[PI] D. (2009) Afforestation of semi-arid shrubland reduces biogenic NO emission from soil. *Soil Biology & Biochemistry 41: 1561-1570*. (19 citations; IF 8.546; 2/39; Q1)
8) **Gelfand[PD] I**, Snapp[C] SS, Robertson[PI] GP. (2010) Energy efficiency of conventional, organic, and alternative cropping systems at a site in the US Midwest. *Environmental Science & Technology 44: 4006-4011*. (107 citations; IF 11.357; 8/54; Q1)
9) **Gelfand[PD] I**, Zenone[PD] T, Jasortia[PD] P, Chen[PI] J, Hamilton[PI] SK, Robertson[PI] GP. (2011) Carbon debt of a Conservation Reserve Program (CRP) grassland converted to bioenergy production. *Proceedings of the National Academy of Sciences (USA) 108: 13864-13869*. (238 citations; IF 12.779; 9/73; Q1)
10) **Gelfand[S] I**, Grünzweig[PI] JM, Yakir[PI] D. (2012) Slowing of nitrogen cycling and increasing nitrogen use efficiency in semi-arid afforestation. *Oecologia 168(2): 563-75*. (22 citations; IF 3.298; 71/173; Q2)
11) Zenone[PD] T, **Gelfand[PD] I**, Chen[PI] J, Hamilton[PI] SK, Robertson[PI] GP. (2013) From set-aside grassland to annual and perennial cellulosic biofuel crops: Effects of land use change on carbon balance. *Agricultural and Forest Meteorology 182-183: 1-12*. (46 citations; IF 6.424; 7/90; Q1)
12) **Gelfand[PD] I**, Sahajpal[S] R, Zhang[C] X, Izzauralde[PI] CR, Gross[C] KL, Robertson[PI] GP. (2013) Sustainable bioenergy production from marginal lands in the US Midwest. *Nature 493: 514-517*. (676 citations; IF 69.504; 1/73; Q1) (Highly Cited Paper by ISI)

13) Sahajpal[S] R, Xuesong[C] Z, Izzauralde[PI] CR**, Gelfand**[PD] **I**, Hurtt[PI] GC. (2014) Identifying representative crop rotation patterns and grassland loss in the US Western Corn Belt. *Computers and Electronics in Agriculture 108:173-182*. (57 citations; IF 6.757; 4/59; Q1)
14) **Gelfand**[PD] **I** and Robertson[PI] GP. (2015) A reassessment of the contribution of soybean biological nitrogen fixation to reactive N in the environment. *Biogeochemistry 123:175-184*. (51 citation; IF 4.812; 39/202; Q1)
15) **Gelfand**[PD] **I**, Cui[S] M, Tang[PI] J, Robertson[PI] GP. (2015) Short-term drought response of N_2O and CO_2 emissions from mesic agricultural soils in the US Midwest. *Agriculture, Ecosystems & Environment 212:127-133.* (36 citation; IF 6.576; 5/59; Q1)
16) Zenone[C] T, Zona[C] D, **Gelfand**[C] **I**, Gielen[C] B, Camino Serrano[C] M, Ceulemans[PI] R. (2015) The offset of CO_2 uptake by CH_4 and N_2O emissions in poplar short-rotation coppice. *GCB Bioenergy DOI: 10.1111/gcbb.12269* (28 citations; IF 5.957; 9/90; Q1)
17) Abraha[PD] M, **Gelfand**[PD] **I**, Shao[S] C, Su[S] Y-J, Hamilton[PI] SK, Robertson[PI] GP, Chen[PI] J. (2016) Ecosystem water-use efficiency of annual corn and perennial grasslands: Contributions from land-use history and species composition. *Ecosystems (*DOI:10.1007/s10021-016-9981-2*).* (46 citations; IF 4.345; 50/173; Q2)
18) **Gelfand**[PD] **I**, Shcherbak[S] I, Millar[C] N, Kravchenko[C] AN, Robertson[PI] GP. (2016) Long-term nitrous oxide fluxes in annual and perennial agricultural and unmanaged ecosystems in the upper Midwest USA. *Global Change Biology* 22, 3594-3607. (56 citations; IF 13.212; 1/65; Q1)
19) Oates[PD] LG, Duncan[S] DS, **Gelfand**[C] **I**, Millar[C] N, Robertson[PI] GP, Jackson[PI] RD. (2016) Nitrous oxide emissions during establishment of eight alternative cellulosic bioenergy cropping systems in the North Central U.S. *GCB Bioenergy,* 8(3), 539-549. DOI*: 10.1111/gcbb.12268*; (60 citations; IF 5.957; 9/90; Q1)
20) *Abraha[PD] M, **Gelfand**[PD] **I**, Hamilton[PI] SK, Chen[PI] J, Robertson[PI] GP. (2018) Legacy effects of land use on soil nitrous oxide emissions in annual crop and perennial grassland ecosystems. *Ecological Applications* (doi:10.1002/eap.1745); (20 citations; IF 6.105; 25/173; Q1)
21) *Duncan[S] DS, Oates[PD] LG, **Gelfand**[PD] **I**, Millar[C] N, Robertson[PI] GP, Jackson[PI] RD. (2019) Environmental factors function as constraints on soil nitrous oxide fluxes in bioenergy feedstock cropping systems. *GCB-Bioenergy*, 11(2), 416-426. doi: 10.1111/gcbb.12572. (5 citation; IF 5.957; 9/90; Q1)
22) *Abraha[PD] M, **Gelfand**[PD] **I**, Hamilton[PI] SK, Chen[PI] J, Robertson[PI] GP. (2019) Carbon debt of field-scale Conservation Reserve Program grasslands converted to annual and perennial bioenergy crops. *Environmental Research Letters* (14) 024019 (27 citation; IF 6.947; 55/279; Q1)
23) ***Gelfand** [PD] **I**, Hamilton[PI] SK, Kravchenko[C] AN, Jackson[PI] RD, Telen[PI] K, Robertson[PI] GP. (2020) Empirical Evidence for the Potential Climate Benefits of Decarbonizing Light Vehicle Transport in the US with Bioenergy from Purpose-Grown Biomass with and without BECCS. *Environmental Science & Technology*, 54(5), 2961-2974. doi.org/10.1021/acs.est.9b07019 (38 citations IF 11.357; 8/54; Q1)
24) *Groenveld[S] T, Lazarovitch[C] N, Kohn[C] YY, **Gelfand**[PI] **I**. (2020) Environmental tradeoffs between nutrient recycling and greenhouse gases emissions in an integrated

aquaculture–agriculture system. *Environmental Science & Technology*, 54(15), 9584–9592. https://doi.org/10.1021/acs.est.0c00869 (2 citation; IF 11.357; 8/54; Q1)

25) *Nejidat[PI] A, Diaz-Reck[T] D, **Gelfand[PI] I**, Zaady[PI] E. (2021) Persistence and spread of tetracycline resistance genes and microbial community variations in the soil of animal corrals in a semi-arid planted forest. *FEMS Microbiology Ecology*, 97(8), fiab106, https://doi.org/10.1093/femsec/fiab106 (IF 4.519; 59/136, Q1)

26) *Minikaev[S] D, Zurgel[T] U, Tripler[C] E, **Gelfand[PI] I**. (2021) Effect of increasing nitrogen fertilization on soil nitrous oxide emissions and nitrate leaching in a young date palm (*Phoenix dactylifera* L., cv. Medjool) orchard. *Agriculture, Ecosystems, and Environment* 319, 107569. https://doi.org/10.1016/j.agee.2021.107569 (4 citation; IF 6.576; 5/59, Q1)

27) *Shrestha[S] RC, Ghazaryan[T] L, Poodiack[S] B, Zorin[C] B, Gross[C] A, Gillor[C] O, Khozin-Goldberg[PI] I, **Gelfand[PI] I**. (2021) The effects of microalgae-based fertilization of wheat on yield, soil microbiome and nitrogen oxides emissions. *Science of the Total Environment* https://doi.org/10.1016/j.scitotenv.2021.151320 (IF 10.753; 26/279, Q1)

28) *Pan[S] D, **Gelfand[PI] I**, Tao[C] L, Abraha[C] M, Sun[C] K, Guo[S] X, Chen[PI] J, Robertson[PI] GP, Zondlo[PI] MA (2021) Minimizing thermal density effects on open-path eddy covariance measurements: a new laser-based N_2O sensor. *Global Change Biology* (IF 13.211; 1/65; Q1)

29) Yagle[S] I, Segoli[C] M, **Gelfand[PI] I**. (2023) Patch establishment of the summer annual saltwort plant (*Salsola inermis* Forssk.) increases N cycling rates and soil nitrous oxide emissions in Israel's Negev Desert. *Plant and Soil* (accepted)

(a) Authored books

Book chapter

Gelfand I and Robertson GP. (2015) Mitigation of greenhouse gases in agricultural ecosystems. *In:* Hamilton SK, Doll JE, Robertson GP. Eds. "The ecology of agricultural landscapes: Long-term research on the path to sustainability", pp. 310-338. Oxford Univ. Press. (19 citations)

(b) Published conference proceedings, scientific reports, and technical papers

Yakir D, **Gelfand I**, Rotenberg E. (2014) Relationships between carbon sequestration and nitrogen cycling in a semi-arid forest. *Proceedings of The Dahlia Greidinger International Symposium 2013.*

Gelfand I, Cui M, Tao L, Sun K, Zenone T, Tang J, Chen J, Zondlo, MA, Robertson GP. (2014) New techniques for nitrous oxide fluxes research, inter-comparison, validation, and measurements of nitrous oxide emissions from agricultural soils: the role of soil carbon, nitrogen, and water availability. *Proceedings of The Dahlia Greidinger International Symposium 2013.*

Gelfand I. (2014) Sustainable biomass and marginal land. Report for the workshop "Sustainable Biomass Drives the Next Bioeconomy: A New Industrial Revolution". *OECD 2014*.

(c) Unrefereed professional articles and publications (book reviews, encyclopedia articles, museum catalogs, etc.)

Gelfand I. (2013) The Yatir forest site: The nitrogen perspective. *FluxLetter, The newsletter of Fluxnet 5, 2: 25-26*.

• Lectures and Presentations at Meetings and Invited Seminars

(a) Invited plenary lectures at conferences/meetings and professional panels and invited lectures at professional meetings/workshops; (* - since appointment at BGU; # keynote or plenary)

1) **Gelfand I**, Cytryn E, van Rijn J. (2002) Sulfide oxidation in a zero-discharge marine recirculating system. *The Annual Dan Popper symposium of the National Center for Mariculture*. Eilat, Israel.
2) **Gelfand I** and Yakir D. (2006) Nitrite accumulation in the soil profile of semi-arid ecosystems in response to seasonal changes in environmental conditions. *EGU General Assembly*. Vienna, Austria.
3) **Gelfand I**, Hamilton SK, Robertson GP. (2011) Carbon and energy balances for cellulosic biofuel crops converted from CRP lands. *ESA 2011 Annual meeting*. Austin, TX, USA.
4) **Gelfand I**, Sahajpal R, Zhang X, Izzauralde CR, Robertson GP. (2010) Biofuel production and climate mitigation potential from marginal lands in US North Central region. *AGU 2010 Annual meeting*. San Francisco, CA, USA.
5) **Gelfand I**, Zenone T, Jasrotia P, Chen J, Hamilton SK, Robertson GP. (2010) Conversion of CRP grassland to cropping systems for bioenergy production causes large CO_2 emissions. *ESA 2010 Annual meeting*. Pittsburgh, PA, USA.
6) **Gelfand I**, Snapp SS, Robertson GP. (2010) Energy efficiency of conventional, organic, and alternative cropping systems for food and fuel production at a site in the US Midwest. *Climate Change Vulnerabilities and Opportunities: Michigan and Beyond*. East Lansing, MI, USA.
7) **Gelfand I**, Cui M, Tao L, Sun K, Tang J, Zondlo MA, Robertson GP. (2012) Effects of land-use history, fertilization, and precipitation on short-term N_2O emissions from agricultural soils using open-path eddy flux N_2O and static chamber methods. *AGU 2012 Annual meeting*. San Francisco, CA, USA.
8) **Gelfand I**, Zenone T, Jasrotia P, Chen J, Hamilton SK, Robertson GP. (2012) Carbon balance of converting conservation reserve program (CRP) grasslands to agriculture. *ESA 2012 Annual meeting*. Portland, OR, USA.
9) **Gelfand I**, Hamilton SK, Robertson GP. (2012) Carbon and energy balances for cellulosic biofuel crops in U.S. Midwest. *EGU General Assembly*. Vienna, Austria.
10) **Gelfand I**. (2013) Can we produce sustainable biofuels? *Israeli Sustainable Energy Society meeting*. Haifa, Israel.
11) **Gelfand I**, Cui M, Tang J, Robertson GP. (2013) Nitrous oxide and carbon dioxide emissions from agricultural soils: the role of soil carbon, nitrogen, and water availability. *The Dahlia Greidinger International Symposium.* Haifa, Israel.
12) **Gelfand I**. (2013) What have we learned about marginal lands, their productivity, and the resulting biomass? *GLBRC annual meeting*. South Bend, IN, USA.

13) #**Gelfand I** and Robertson GP. (2013) Productivity and environmental benefits of switchgrass on marginal land of the US Midwest. *Switchgrass II*, Madison, WI
14) **Gelfand I** (2014) Sustainable biomass and marginal land. Expert panel for OECD workshop "Sustainable Biomass Drives the Next Bioeconomy: a New Industrial Revolution". *OECD Headquarters*. Paris, France.
15) **Gelfand I** (2014) Field level carbon balance. Workgroup "Liquid fuels and carbon accounting" *University of Michigan Energy Institute*. Ann Arbor, MI, USA.
16) **Gelfand** I, Shcherbak I, Kravchenko AN, Millar N, Robertson GP. (2015) Long-term nitrous oxide (N_2O) fluxes in the upper Midwest USA: A comparison between annual and perennial systems. *Joint Assembly*. Montreal, Canada.
17) ***Gelfand I**, Abraha M, Pan Da, Tang J, Chen J, Zondlo MA, Robertson GP. (2017) Evaluation of field-based quantum cascade lasers for measuring N_2O fluxes from static chambers and eddy covariance towers. ILTER Meeting, Taiwan.
18) *#**Gelfand I** (2022) Not only soil organic matter; effect of alternative fuels adaptation and increasing soil carbon on soil greenhouse gases emissions and atmospheric carbon balance. SOM 2022 Seoul, Republic of Korea.
19) ***#Gelfand I** (2022) Nitrogen in Israeli agriculture. Farmers day organized by Gat-Fertilizers
20) ***#Gelfand I** (2022) Young dates fertilization in Arava valley. Farmers day organized by R&D Hatziva
21) ***Gelfand I** (2022) Pepper fertilization. Farmers day organized by R&D Hatzivaץ

(b) <u>Presentation of papers at conferences/meetings (oral or poster † - undergraduate student, * - since appointment at BGU)</u>

1) **Gelfand I** and Robertson GP. (2009) Full – carbon analysis of cellulosic biofuels produced from early successional vegetation. *ESA 2009 Annual meeting*. Albuquerque, NM, USA.
2) **Gelfand I**, Shcherbak I, Millar N, Robertson GP. (2011) Management controls on nitrous oxide emissions from row crop agriculture. *AGU 2011 Annual meeting*. San Francisco, CA, USA.
3) **Gelfand I**, Cui M, Tang J, Robertson GP. (2013) Nitrous oxide and carbon dioxide emissions from agricultural soils: the role of soil carbon, nitrogen, and water availability. *ESA 2013 Annual meeting*. Minneapolis, MN, USA.
4) **Gelfand I**, Shcherbak I, Robertson GP. (2013) Agricultural management and environment controls long-term soil nitrous oxide fluxes. *AGU 2013 Annual meeting*. San Francisco, CA, USA.

5) **Gelfand I**, Gallagher† C, Moneymaker† BCG, Robertson GP. (2014) Relative importance of nitrous oxide vs. nitric oxide emissions from soils across a management intensity and biodiversity gradient. *AGU 2014 Annual meeting*. San Francisco, CA, USA.
6) **Gelfand** I, Moyer† R, Poe† A, Da Pan, Abraha M, Chen J, Zondlo MA, Robertson GP. (2015) Diurnality of soil nitrous oxide (N_2O) emissions. AGU 2015 Annual meeting. San Francisco, CA, USA.
7) **Gelfand** I, Kravchenko AN, Hamilton SK, Jackson RD, Thelen KD, Robertson GP. (2016) Climatic impacts of managed landscapes for sustainable biofuel feedstocks production. AGU 2016 Annual meeting. San Francisco, CA, USA.
8) ***Gelfand I**, Abraha M, Pan Da, Tang J, Chen J, Zondlo MA, Robertson GP. (2018) Evaluation of field-based quantum cascade lasers for measuring N_2O fluxes from static chambers and eddy covariance towers. *EGU General Assembly*. Vienna, Austria.
9) *Abraha M, **Gelfand I**, Hamilton SK, Chen J, Robertson GP. (2019) Carbon debt of field-scale Conservation Reserve Program grasslands converted to annual and perennial bioenergy crops. *The Dahlia Greidinger International Symposium.* Haifa, Israel.
10) *Abraha M, **Gelfand I**, Hamilton SK, Chen J, Robertson GP. (2019) Field-scale carbon balance of grasslands converted to annual and perennial bioenergy crops. *EGU General Assembly*. Vienna, Austria.
11) *Shrestha RC[S], Khozin-Goldberg I, **Gelfand I**. (2019) Biofertilization of wheat with algal biomass reducing soil nitrous oxide emission without yield penalty in desert agroecosystems. *2019 AGU Fall Meeting*. San Francisco, CA, USA.
12) *Minikaev D and Gelfand I. (2021) Effect of increasing nitrogen fertilization on soil nitrous oxide emissions and nitrate leaching in a young date palm (*Phoenix dactylifera* L., cv. Medjool) orchard. *ASA, CSSA & SSSA International Meeting*. Salt Lake City UT, USA
13) *Lumor E and Gelfand I. (2021) Nitrogen fertilization has no effect on soil nitrogen oxides emissions in carrot (*Daucus carota*) crop cultivated on mineral soils in Mediterranean climate. *Israeli Agricultural Societies Meeting.* Ramat Gan. Israel.
14) *Yagle I and Gelfand I. (2022) Invasive mesquite (*Prosopis juliflora*) reducing soil nitrogen and carbon oxides emissions during rewetting in the Dead Sea valley, Israel. ESA&SCEE joint meeting, Montreal, CA.

(c) <u>Presentations at informal international seminars and workshops</u>
(d) Seminar presentations at universities and institutions Year, department, university/institution, title of presentation (* - since appointment at BGU)

1) 2013 Department of Plant Sciences, UC-Davis. "Is it possible to grow ecologically sustainable bioenergy crops in the US Midwest"?
2) 2013 Molecular Biology & Ecology of Plants, Tel Aviv University. "How land-use and management affect nutrient cycles in (agro)ecosystems".

3) 2013 Department of Plant Sciences, Weizmann Institute of Science. "How land-use and management affect nutrient cycles in agroecosystems".
4) 2013 Department of Plant Sciences, Hebrew University of Jerusalem. "How land-use and management affect nutrient cycles in agroecosystems".
5) 2014 Department of Biology, University of Antwerp. "Is it possible to grow ecologically sustainable bioenergy crops in the US Midwest"?
6) 2014 Department of Biology, University of Miami. "How land-use and management affect nutrient cycles in (agro)ecosystems".
7) 2015 Department of Plant, Soil and Microbial Sciences, Michigan State University. "How land-use and management affect nutrient cycles in agroecosystems in the US Midwest".
8) 2016 FAAB, Ben Gurion University. "How land-use and management affect nutrient cycles in agroecosystems in the US Midwest".
9) *2018 Department of Plant Sciences, Weizmann Institute of Science. “Effect of land-use change on ecosystemal carbon, nitrogen, and water cycles in mesic climate”.
10) *2018 Department of Soil Sciences, HUJI “Effect of land-use change on ecosystemal carbon, nitrogen, and water cycles in mesic climate”.
11) *2019 Department of Geography, BGU "How land-use and management affect nutrient cycles in (agro)ecosystems".
12) *2020 Soil, Water and Environmental Sciences Institute. ARO, Rishon LeZion “Environmental tradeoffs of nitrogen fertilization in Israeli agriculture and beyond”.
13) *2020 Department of Geology and Environmental Sciences. BGU "Environmental tradeoffs of nitrogen fertilization in Israeli agriculture and beyond"
14) *2021 FAAB, BGU "Environmental tradeoffs of nitrogen fertilization in Israeli agriculture and beyond".
15) *2021 Biosystems Engineering and Soil Science. University of Tennessee. Knoxville. "Environmental tradeoffs of nitrogen fertilization in Israeli agriculture".
16) *2021 Digital Agriculture Laboratory. Skoltech Institute, Moscow, Russia. "Environmental tradeoffs of nitrogen fertilization in Israeli agriculture".
17) *2021 Russian Timiryazev State Agrarian University, Moscow, Russia. "Environmental tradeoffs of nitrogen fertilization in Israeli agriculture".

• **Research Grants** (* - since appointment at BGU, in USD of 2021); received $1,596,776 since first academic appointment.

2006 - *European Science Foundation (ESF)*, Short-term exchange grant. “Influence of land-use change on NO fluxes from soils of semi-arid ecosystems and climatic gradient.” MPI for Chemistry, Mainz, Germany. PI, $4,128

2014 - 2016 *NSF EAGER Program* – “Development of a new technique to measure ecosystem-level soil nitrous oxide emissions using micrometeorological towers”. Leading PI, Co-PIs: Robertson GP (MSU), Zondlo MA (Princeton); $140,000 ($70,000 to Gelfand).

*2018 – 2020; Goldinger Foundation – Use of algal biofertilizer for sustainable wheat production. Leading PI, Co-Pi Inna Kozhin (BGU); $30,000

*2018 – 2020; Koshland Foundation – Effect of potential N fixation in Salsola plants on ecosystemal N cycle in the Negev desert. Leading PI, Co-Pi Michal Segoli (BGU); $40,000.
*2019 – 2020; ICA – Effect of nitrogen fertilization on environmental impact of agriculture in Negev. PI, $50,000.
*2019 – 2023; Ministry of Science and Technology, Israel - Consequences of invasive *Prosopis* species for ecosystems functioning around the Dead Sea and strategies to prevent future invasions. PI, co-Pi Jose Gruenzweig, (HUJI), $248,329 ($173,920 to Gelfand).
*2020 – 2024; eLTER-PLUS, European Long-Term Ecological Research network; co-I in biogeochemical responses WP. $14,155 to Gelfand.
*2020-2024; ISF, Understanding effects of varying nitrogen and carbon availability on soil emissions of nitrogen oxides in drylands. PI, $574,557 (including an award of $198,766 for new equipment).
*2021-2024; BARD, Unraveling the biogeochemical mechanisms of drought and rewetting induced nitric and nitrous oxide emissions from dryland agriculture. Israeli PI (with Saha Debasish, USA PI, Sean M. Schaeffer co-I, Sindhu Jagadamma co-I), $310,000 ($155,000 to Gelfand).
*2022-2024; Ministry of Science and Technology, Israel - Developing new eco-responsible iron colloidal phases to improve Fe availability and soil physico-chemical properties for agriculture. Maimonide Hubert Curien Program. Israeli PI with Mathieu Pedrot, University of Rennes 1, France ($103,618 to Gelfand).
*2023-2026; Ministry of Agriculture and Rural Development, Israel - Calibrating fertilization rates for the dates production in Israel – testing optimum rates of fertilization to minimize environmental impacts of the date crop. PI, co-PI Yermiyahu and Ben-Gal (ARO) $226117 ($188911 to Gelfand).

• **Present Academic Activities**

Research in progress:

1) Effect of potential N fixation in *Salsola* plants on ecosystemal N cycle in the Negev desert.
2) Use of algal biofertilizer for sustainable wheat production.
3) Effect of nitrogen fertilization on environmental impact of agriculture in the Negev Desert (carrot cultivation) and Arava Valley (peppers and dates cultivation).
4) Effect of invasive *Prosopis sp* on biogeochemistry of the Dead Sea valley.
5) Understanding effects of varying nitrogen and carbon availability on soil emissions of nitrogen oxides in drylands.
6) Effects of drought and re-wetting on soil N oxides emissions from dryland agriculture.
7) NutNet - effect of increasing nutrient availability on biogeochemistry of the Negev desert.
8) Rhizosphere effects on soil N oxides emissions.
9) Iron availability for biological activity in desert soils.

Articles in preparation:

1) *Lumor^{S} JE, Zurgel^{T} U, **Gelfand**^{PI} **I**. Nitrogen fertilization has no effect on soil nitrogen oxides emissions in carrot (*Daucus carota*) crop cultivated on mineral soils in Mediterranean climate. *In review*

2) Osei-Yeboah[S] M, **Gelfand[PI] I**. Change in nutrient availability and rainfall has little effect on soil N cycle in desert. *In preparation*
3) Yagle[S] I, **Gelfand[PI] I**. Invasion by *Prosopis* slowing down nitrogen cycle in the Dead Sea valley. *In preparation*
4) Demangeat[PD] E, Yagle[S] I, **Gelfand[PI] I**. Nitrous oxide emissions during rewetting of dry desert soils are abiotic. *In preparation*
5) Welkman[PD] E. **Gelfand[PI] I**. Drought differently affecting soil trace gases emissions from soil developed across a precipitation gradient. *In preparation*
6) Victor[S] V, Kolton[C] M, **Gelfand[PI] I**. Rhizosphere exudates enhancing soil nitrous oxide emissions but have no effect on soil nitric oxide emissions. *In preparation*

• **Additional Information**

Workshops, symposia, workgroup, and conference organization (* - since appointment at BGU)

2005 – Co-organizer, Fifth Conference on Active Research by Environmental Science Students. *Weizmann Institute of Science*, Israel.
2007 – Head of the organizing committee, Sixth Conference on Active Research by Environmental Science Students. *Weizmann Institute of Science*, Israel.
2011 – Organizer of symposium "Biogeochemical implications of bioenergy crop production" *Ecological Society of America Annual meeting*, Austin, TX, USA.
- Organizer of workshop: "Ecophysiology of successional grassland: Evidence from stable isotopes" *Kellogg Biological Station*, Hickory Corners, MI, USA.
2012 – Co-organizer of workgroup "Impacts of land-use change on carbon and nitrogen cycling: a cross-site opportunity" *Long-Term Ecological Research Network All Scientists Meeting*. Estes Park, CO, USA.
– Co-convener of symposium "Organic farming, soils, and energy balance" *European Geosciences Union General Assembly*. Vienna, Austria.
2013 – Co-organizer of workgroup "Marginal lands and their potential for biofuel" *GLBRC annual meeting*. South Bend, IN
* 2019 – Co-Organizer of Annual meeting of Israeli Soil Science Society, Midreshet Ben Gurion, Israel (on site logistic and organization).
* 2020 – Co-Organizer of Annual meeting of Israeli Soil Science Society (virtual meeting).
* 2022 – Co-Organizer of SOM 2022, Seoul, Republic of Korea.
* 2022 – Section organizer DDD conference, Midreshet Ben Gurion, Israel.
* 2022 – Co-Organizer of Annual meeting of Israeli Soil Science Society.

Outreach and community services (* - since appointment at BGU)

1995-1996 - Mentor, the Perah Tutorial Project – mentoring of children from unprivileged backgrounds. *The Hebrew University of Jerusalem*. Israel
2001-2002 - Instructor, *Weizmann Institute for Science, Davidson Institute of Science*. The Students' Unit: K-12 program for advanced sciences students. Israel
2008 - 2017 - Guiding KBS LTER and GLBRC field outreach tours for scientists and public. MI, USA.
*2017 – current – scientific outreach through BGU.

• **Media coverage**

Gelfand et al., (2013) *Nature*:

"News and Views" of *Nature* (493:483-485), *Biofuels*, NSF web site, Scientific American, NPR (http://tinyurl.com/Gelfand-NPR), German national radio (Deutschlandfunk; http://tinyurl.com/GER-Gelfand), Brazilian, German, and Spanish news media, Science Daily, Biofuel Daily. Recommended by F1000.

Gelfand et al., (2011) *Proceedings of the National Academy of Sciences (USA)*:

Various educational, business, and environmental news outlets, including Science Daily (http://tinyurl.com/pxn76je) and Biofuel Daily (http://tinyurl.com/ndssvnc); EESI - http://tinyurl.com/okpcedz.

Gelfand et al., (2010) *Environmental Science & Technology*:

Environmental Science & Technology (44:3648), and *Frontiers in Ecology and the Environment* (5:229), Biofuel Daily (http://tinyurl.com/p7rfdpe), US News and World report (http://tinyurl.com/o6fwr5h), and Science Daily (http://tinyurl.com/27r932e).

• **Synopsis of research**

Increasing societal demands for food, fuel, and fiber requires difficult land-use decisions that may threaten the quality of the air, water, and soil resources that underpin the long-term sustainability of terrestrial ecosystems. My research focuses on two main directions: 1) how anthropogenic activities, particularly management and new species introduction, affect ecosystem carbon and nitrogen balances and soil nitrous and nitric oxides emissions in terrestrial ecosystems? and 2) what soil microbial processes and chemo-physical conditions control soil nitrous and nitric oxides emissions? I use field and laboratory experiments to study these questions.

Currently my laboratory is working in three major directions:

1. Effect of management on the environmental performance of agroecosystems

To determine the environmental performance of agroecosystems I am performing field experiments with detailed measurements of soil greenhouse gases (GHG) emissions, nitrate (NO_3^-) leaching, and soil nitrogen pools dynamics. My field experiments are supported by laboratory measurements of microbial activity related to soil nitrogen cycle: mineralization and nitrification. Currently my laboratory is involved in three projects, all related to the effect of nitrogen fertilization rates and types on the environmental performance of agroecosystems. With funding from ICA and Margolis foundations we performed 4-level nitrogen fertilization experiment in young date plantation (reference **26**; led by Minikaev, a MS student in my group) and 5-level nitrogen fertilization addition in a carrot field (in preparation, led by Lumor, a MS student in my group). Both experiments were aiming to understand tradeoffs between fertilization, productivity, and environmental impacts of these crops. The latter was a collaboration with Netafim (private irrigation-solution company), kibbutz Urim, and Hevel Maon (horticultural company). Finally, we performed an algae-based

biofertilizer application experiment with wheat crop, aiming to develop new, environmentally friendly fertilizer type (reference **27**; led by Shrastha, a MS student in my group).

2. Consequences of invasive *Prosopis* species for ecosystems functioning around the Dead Sea and strategies to prevent future invasions.

Collaborative research on the impact of invasive species on biogeochemistry of Dead Sea valley is funded by Israeli Ministry of Sciences and Technology (2019-2022). This research is done in collaboration with Prof. Gruenzweig from the Hebrew University of Jerusalem and performed by Yagle, a PhD student and Dr. Demangeat, a postdoctoral researcher in my group. This research is motivated by the fact that invasive species are modifying invaded ecosystems and have a sizable impact on the ecosystem ecology and biogeochemistry. We study genus *Prosopis*, a leguminous tree or large shrub, that is an important invasive species known to encroach USA and African drylands. In Israel the genus is widely used as ornamental tree, planted in the Negev desert and around the Dead Sea by the Jewish National Fund since the 60th. As a result, a recent survey found that ~700 km^2 in Israel were invaded by exotic *Prosopis* species, spontaneously originating from planted populations. Some of those invasions occurred in the sensitive ecosystems around the Dead Sea, and a further large risk of invasion in this region arises from a) creation of new potential habitats due to the Dead Sea retreat and b) the vast invasive *Prosopis* populations at the eastern side of the Dead Sea in the Kingdom of Jordan. The environmental conditions promoting invasiveness and the impact of this N-fixing tree encroachment on ecosystem composition and functioning in Israel are not known. This project aims a) to identify the specific geophysical and soil conditions supporting invasiveness by these species, and b) to assess the ecological and biogeochemical consequences of *Prosopis* encroachment.

3. The controls on soil greenhouse gas emissions

With funding from Israel Science Foundation (2020-2024) my group is starting to investigate effects of varying nitrogen and carbon availability on soil emissions of nitrogen oxides in drylands. Nitrogen is the main macronutrient limiting primary productivity on Earth. While abundant in the atmosphere, it is inaccessible to living organisms without being fixed to ammonium (NH_4^+). N fixation initiates the N cascade in which numerous organic, inorganic, and gaseous forms of N are interchanged, in processes that are mediated by biological and abiotic reactions. Despite intensive studies during past ~65 years, our knowledge on specific drivers and rates of N transformations in terrestrial ecosystems is still rather limited due to the difficulty of translating results from the laboratory experiments to the field scale and generalization of results from the field measurements alike. The most uncertain part of the N cycle is soil N oxides loss, which is difficult elucidate since the process is controlled by most of the known biological and abiotic reactions: heterotrophic and autotrophic, aerobic and anaerobic, oxidation and reduction. In addition, our inability to measure gaseous N emissions at needed temporal and spatial resolutions is hampering our ability to predict and model gaseous N release from soils and ecosystems. Moreover, knowledge about the controls of soil emissions of N oxides forms in high-temperature ecosystems, such as deserts is scarce. In

deserts, an interplay between high temperature and short water availability times can cause high but short-lived emissions that are difficult to measure and predict. In this project we will use controlled field experiments to study the effects of environmental factors, e.g., water and temperature, as well as the availability of substrates, (carbon (C) and N) on the N oxides fluxes. While using natural temperature variability, we will manipulate water and soil C and N levels and measure fluxes of N_2O and NO to develop predictive relationships between these factors and the gaseous N loss. Specific attention will be given to the inflection points (thresholds) of the emission rates as they are affected by changing soil temperature, water, C, and N availability. Knowledge gained during this research will contribute to our ability to predict soil fluxes of N oxides in high-temperature ecosystems and elsewhere.

• **Teaching Statement**

I consider teaching to be an essential part of a successful scientific career. I believe that classroom curriculum must go beyond what is already known and challenge students to learn how scientific questions and theories are developed and how science is done. This approach requires both depth and breadth of knowledge of instructors, who must keep pace with current research.

I have a diverse background in biogeochemistry and ecology, having worked with different model systems during my graduate and postdoctoral training. I love to share my knowledge and experience with younger researchers and my enthusiasm helps me get students excited about topics in ecosystem ecology and biogeochemistry. In my teaching, I always include examples of the most current exciting research. I also incorporate hands-on learning experiences through laboratory and field work. In addition to professional knowledge, I believe that my international experience gives me a valuable perspective and better equips me to mentor students from diverse backgrounds.

At the BGU I am teaching two courses on a regular basis, for bachelor students at the Department of Geography and Environmental Development, and for graduate students at BDIR. In addition, I am coordinating a course for the international students at BDIR. I have different goals, specialized for a specific course, I am trying to achieve.

While teaching my bachelor's degree students (Energy and Environment) my main goal is to educate the students about environmental issues in Israel, as an example of very similar environmental issues in the world. And to explain to them the connection between lifestyle and environmental impact. In my graduate course (Terrestrial Biogeochemistry) I am trying to fill up the knowledge gap that exists in today's students in the understanding of global context of their specific research. Today students' specialization and concentration on novel techniques created this gap between immediate problems which needed to be solved, and the greater context of why these problems are important. Students who work on genetics and molecular biology of plants are not always aware of why we want to understand plant's molecular biology and cell-functioning. I have found that many of today's graduate students in plant sciences have never been in the field and never asked their selves questions why the carbon balance and photosynthesis is important for humanity. In my work with international students during the Sustainable Agricultural Solutions course, my main goal is to provide a hand-on experience in agricultural research in Israel and to show and advertise BGU and Israel.

I am trying to fit my teaching methods to the goals, during the Energy and Environment course I ask students to choose and to evaluate environmental performance of a household device they are familiar with and to prepare a written work about the process using tools we learn during the course. And to explain why they chose the given devise and how they can reduce environmental costs of the devise usage. In addition, during the course we have a field tour to one of the Israeli electrical power plants (conventional or solar) where students have an opportunity to discuss the power plant functioning and Israeli electrical grid in general with engineers. While teaching the Terrestrial Biogeochemistry course I try to connect between atoms and global budgets/cycles of elements. During this course, students need to prepare presentations on biogeochemical papers and discuss them in class with their peers. Finally, in my course for international students we are organizing both scientific and cultural field tours and performing a short field experiment. During the field experiment students use state-of-art instrumentation and learn how to perform agricultural research.

To evaluate student's engagement and comprehension, besides common grading and examination, we have class discussions on questions related to course theme and solving related problems in class. During problem solving I use tools we learned during the course.

In future, I want to develop a new summer course, open to students from all Israeli universities, where we will discuss and learn how to measure soil trace gases emissions using state-of-art instrumentation available in my laboratory. I think that there are not enough courses teaching biogeochemistry and ecosystem ecology are proposed in Israeli universities in general and techniques to study ecosystems ecology are little known. For courses I teach currently, I want to include hand-on experience in my Terrestrial Biogeochemistry course and to take students to the field. I feel that it would improve their understanding of what biogeochemistry is.