


# Sayanta Bera

7250 S Ora Ct, Greenbelt, USA, 20770

sbera@umd.edu;  @sayan\_bera3; <https://sayantabera.owlstown.net>

## Education

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- Ph.D., CBGP - UPM, Madrid, Spain. (Excellent cum laude) Feb 2018
- M.Sc., Life Science, Jawaharlal Nehru University, New Delhi, India. Oct 2014
- B.Sc., Microbiology, University of Calcutta, Kolkata, India. Jul 2011

## Research Experience

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- **Post-Doctoral Associate**, University of Maryland, College Park. Nov 2020 – Present  
Advisor: Prof. Anne E. Simon
  - Identification and characterization of a conserved RNA structure in replication and translation of umbraviruses.
  - Understanding the evolution of newly discovered Umbravirus-like viruses (ULVs) and the function of an unknown viral ORF.
  - Characterization of a ULV-derived sub-viral RNA and developing it as a vector.
  - RNA structure-directed engineering of a ULV as a VIGS vector.
- **Post-Doctoral Fellow**, Cornell University, Ithaca. Jan 2020 – Nov 2020  
Post-Doctoral Fellow, University of California, Davis. Nov 2018 – Dec 2019  
(Transferred to Cornell University to follow advisor)  
Advisor: Dr. Clare L. Casteel
  - Investigating the role of molecular and chemical interactions underlying aphid transmission of viruses.
  - Understanding the molecular and ecological role of a potyviral protein, 6K1, through transcriptomic and metabolomic analysis.
  - Collaborative project: Role of multi-trophic interactions in host defense response against insects and viruses.
- **Graduate Research Assistant**, CBGP UPM-INIA, Madrid, Spain. Nov 2014 – Sep 2018  
Advisor: Prof. Fernando Garcia-Arenal
  - Analysis of fitness trade-offs limiting host range expansion in pepper-infecting tobamoviruses.  
Collected viral isolates from wild plants and pepper crops to study host adaptation of viruses and the underlying molecular mechanism; standardized RNA extraction protocol to detect viruses in wild plants without the need for viral particle purification; successfully cloned a recalcitrant field isolate to further characterize the effect of an indel and substitutions in 3' UTR on virus fitness.

## Publications (<https://scholar.google.com/citations?hl=en&user=SzIVZvkAAAAJ>)

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### Peer-reviewed articles

- Mikkelsen A, Gao F, Carino E, **Bera S**, Simon A (2023). -1 Programmed ribosomal frameshifting in Class 2 umbravirus-like RNAs uses multiple long-distance interactions to switch between active and inactive structures and destabilize the frameshift structural element. *Nucleic Acids Res.* gkad744. <https://doi.org/10.1093/nar/gkad744>
- **Bera S**, Ilyas M, Mikkelsen A, Simon A (2023). Conserved structure associated with different 3'CITEs is important for translation of umbraviruses. *Viruses.* 15, 638. <https://doi.org/10.3390/v15030638>
- Moreno-Pérez M.G, **Bera S**, McLeish M, Fraile A, García-Arenal F (2023). Reversion of a resistance-breaking mutation unveils reversion costs and high virus diversity at necrotic local lesions. *Mol Plant Path.* 24 142 -153. <https://doi.org/10.1111/mpp.13281> (Selected for Cover of the Issue)
- Johnson, P.Z.; Reuning, H.M.; **Bera, S.**; Gao, F.; Du, Z.; Simon, A.E. (2022). Novel 3' Proximal Replication Elements in Umbravirus Genomes. *Viruses*, 14, 2615. <https://doi.org/10.3390/v14122615>. (Selected for Cover of the Issue)
- Reyes-Proañó E.G, Mendoza A, Margaria P, Menzel W, **Bera S**, Simon A.E, Quito-Avila D.F (2022). Two new umbravirus-like associated RNAs (ulaRNAs) discovered in maize and Johnsongrass from Ecuador. *Arch of Vir.* <https://doi.org/10.1007/s00705-022-05525-4>
- **Bera S**, Arena GD, Ray S, Flannigan S, Casteel CL (2022). The potyviral protein 6K1 reduces plant protease activity during Turnip mosaic virus infection. *Viruses.* <https://doi.org/10.3390/v14061341>
- Basu S, Lee B, Clark RE, **Bera S**, Casteel CL, Crowder DW (2022). Legume plant defenses and nutrients mediate indirect

interactions between soil rhizobia and chewing herbivores. *Basic Appl Ecol.* <https://doi.org/10.1016/j.baae.2022.08.005>

- Lee B, Basu S, **Bera S**, Casteel CL, Crowder DW. (2021). Responses to predation risk cues and alarm pheromones affect plant virus transmission by an aphid vector. *Oecologia.* <https://doi.org/10.1007/s00442-021-04989-6>
- Basu S, Clark RE, **Bera S**, Casteel CL, Crowder DW. (2021). Responses of pea plants to multiple antagonists are mediated by order of attack and phytohormone crosstalk. *Mol Ecol.* doi: <https://doi.org/10.1111/mec.16103>
- Liu J, Carino E, **Bera S**, Gao F, May JP and Simon AE. (2021). Structural Analysis and Whole Genome Mapping of a New Type of Plant Virus Subviral RNA: Umbravirus-Like Associated RNAs. *Viruses.* 13 (4), 646. <https://doi.org/10.3390/v13040646>
- Moratalla-López N, Parizad S, K. Habibi M, Winter S, Kalantari S, **Bera S**, Lorenzo C, García-Rodríguez M.V, Dizadji A, Alonso G. L. (2021). Impact of two different dehydration methods on saffron quality, concerning the prevalence of Saffron latent virus (SaLV) in Iran. *Food Chem, 337, 127786.* <https://doi.org/10.1016/j.foodchem.2020.127786>
- **Bera S**, Blundell R, Liang D, Crowder D.W, Casteel CL. (2020). The oxylipin signaling pathway is required for increased aphid attraction and retention on virus-infected plants. *J Chem Ecol.* 46, 771–781. <https://doi.org/10.1007/s10886-020-01157-7>
- **Bera S**, Fraile A and García-Arenal F. (2018). Analysis of fitness trade-offs in the host range expansion of an RNA virus, tobacco mild green mosaic virus. *J Virol.* 92: e01268-18
- **Bera S**, Moreno-Pérez M.G, García-Figuera Sara, Pagan I, Fraile A, Pacios L. F and García-Arenal. F. (2017). Pleiotropic effects of resistance-breaking mutations on particle stability provide insight on life history evolution in a plant RNA virus. *J Virol.* 91: e00435-17 (Selected for Spotlight feature)

### Review article

- Parizad S, **Bera S**. (2023). The effect of organic farming on water reusability, sustainable ecosystem, and food toxicity. *Environ Sci Pollut Res.* <https://doi.org/10.1007/s11356-021-15258-7>

### Preprints and under peer-review

- **Ying X<sup>1</sup>**, **Bera S<sup>1</sup>**, Liu J, Toscana-Morales R, Jang C, Yang S, Ho J, Simon AE. (2023). Independent systemic infection of umbravirus-like RNA viruses in the absence of an encoded movement protein. *In Plos Biology.* <sup>1</sup>-**Co-first authors**
- Basu S, **Bera S**, Parizad S, Malhotra P, Casteel CL, Crowder DW. (2023). Virus-encoded RNA silencing suppressor protein critical for disease development: Focus on its' multifunctionality and co-evolution in Solanaceous hosts. *Authorea.*

### **Oral (O) and poster (P) presentations**

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- American Society of Virology, University of Madison-Wisconsin (O) 2022
- American Society of Plant Biology (Virtual) (P) 2021
- Entomological Society of America, St. Louis, MO. (**Invited Speaker**) 2019
- Ecological genomics of coevolutionary interactions, ETH Zurich, Switzerland (O) 2017
- Thesis in 4 minutes, UPM, Spain (O) 2017
- 13<sup>th</sup> International Plant Virus Epidemiology Symposium, Avignon, France (P) 2016

### **Travel award and conference prize**

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- Program Enhancement Fund at Entomological Society of America [\$450] 2019
- Second best poster award at 13th International Plant Virus Epidemiology Symposium, Avignon, France [€250] 2016

### **Funding**

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- Erasmus Mundus Scholarship for doctoral degree, Europe Union [€60,000] 2014 – 2017
- Awarded Fellowship by the Department of Biotechnology, India [₹12,000] 2013 – 2014

### **Teaching and Mentoring Experience**

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- Designed projects and mentored several undergraduates and graduate students. 2015 – current
- Guest lecture in class “Plant Viruses and Disease (PLSCI 4940)” 2020  
conducted by Prof. Keith L. Perry, Cornell University. Topic: Plant Virus Evolution

## Diversity, Equity, and Inclusion

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Mentored a non-binary graduate student at UMD, College Park 2020-2021  
Mentored an undergraduate requiring accommodation at UC Davis 2019

## Professional service

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- **Ad hoc reviewer** in journals: Arthropod-Plant Interactions, Functional Ecology, Environmental and Experimental Botany, Virology Journal, Journal of Experimental Botany, Molecular Biology Reports, Frontiers in Plant Science, Frontiers in Microbiology, Plants, Frontiers in Agronomy, Viruses, Insects, Life, IJMS, Agronomy 2019-current
- **Guest editor** at Frontiers in Ecology and Evolution and Agriculture-Basel 2022-current  
<https://www.frontiersin.org/articles/10.3389/fevo.2023.1251165/full>  
<https://www.frontiersin.org/articles/10.3389/fevo.2022.1080599/full>  
[https://www.mdpi.com/journal/agriculture/special\\_issues/L57731IH1P](https://www.mdpi.com/journal/agriculture/special_issues/L57731IH1P)
- **Judge member** to select best posters in departmental MOCB retreat at UMD, College Park 2022
- **Mentored applicants** for NSF GRFP fellowships in a workshop organized by Botany Society of America 2021
- **Member symposium organizer** at Entomology Society of America conference, Florida (virtual) 2020  
Title: Pathogen-mediated Ecological Interactions: From Microbes to Complex Ecosystems

## Research Grants Experience

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- Wrote a grant with Dr. Clare Casteel for Agriculture and Food Research Initiative – Foundational and Applied Science Program-USDA NIFA. 2020
- Participated in preparing funding applications for Prof. Fernando García -Arenal (CGL2013-44952-R and BFU2015-64018-R) 2016-2017

## Other education and training, qualifications, and skills

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- Bioinformatic tools  
Programming experience in R, MEGA, SEQMAN, DnaSP, Phylogenetic Analysis, Bayes, Figtree, ChimeraX, mFold, Statistical Software – SPSS and Statgraphics, Primer Designing.
- Molecular Biology, Cell Biology, and Chromatography techniques  
Total RNA isolation, Plasmid isolation, Plant virus purification, Reverse-transcriptase Polymerase chain reaction (RT-PCR), Quantitative – PCR, Site-directed mutagenesis, *in-vitro* transcription, Cloning of gene (Gibson Assembly, Gateway Cloning), Virus-induced gene silencing (VIGS), Expression and Purification of proteins, Western blot, Northern blot, Confocal microscope (Leica DMI8), Liquid Chromatography – Tandem Mass Spectrometry (LC-MS-MS), Luciferase assay, RNA secondary structure prediction (selective 2'-hydroxyl acylation analyzed by primer extension, SHAPE).
- Tissue culture techniques  
Agrobacterium-mediated transformation of *Oryza sativa* L. cv. IR64, Transient expression of protein in *Nicotiana benthamiana* through agro-infiltration, Protoplast extraction and electroporation, Transgenic seedlings analysis at molecular, biochemical and physiological level, DAB staining.
- Innovation and Entrepreneurship Course – Translating research into practice, UPM.