



# ABHISHEK KUMAR M.Sc.



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## EDUCATION

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| Ph.D. | Department of Botany, Panjab University, Chandigarh<br><b>Doctoral Thesis:</b> "Climate-driven elevational shifting of plant distributions in Siwaliks of North-Western India"<br><b>Supervisor:</b> Dr. Anand Narain Singh                | 2017 - Present |
| M.Sc. | Department of Botany, Panjab University, Chandigarh<br><b>Masters' Thesis:</b> "Analysis of Antimicrobial activity of ethereal extracts of Azolla pinnata R. Br. against some human pathogens"<br><b>Supervisor:</b> Prof. A. S. Ahluwalia | 2015 - 2017    |
| B.Sc. | Arya PG College, Panipat<br>Kurukshetra University, Kurukshetra<br>Medical (Botany, Chemistry, and Zoology)  | 2012 - 2015    |



## RESEARCH EXPERIENCE

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| <i>M.Sc. Dissertation, Panjab University, Chandigarh</i><br>Advisor: Prof. A. S. Ahluwalia<br>Analysis of Antibacterial activity of ethereal extracts of Azolla pinnata R. Br. against some human pathogens | May 2017 |
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## HONOURS AND AWARDS

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<i>3<sup>rd</sup> Best Poster</i> in National Conference on Climate Change, Biodiversity and Health at CSIR-NBRI, Lucknow	Feb 2020
<i>GATE</i> Graduate Aptitude Test in Engineering	Feb 2017
<i>CSIR-UGC NET JRF</i> Junior Research Fellowship in Life Sciences	Dec 2016

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## RESEARCH INTERESTS

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**Ecophysiology:** plant adaptations and responses to climatic factors; Variation of functional traits of trees with environmental variables (elevation, temperature, rainfall and atmospheric pressure)

**Population Ecology:** population dynamics of mountain trees i.e., *Pinus*, *Quercus* and *Rhododendron*; species distribution modelling

**Community Ecology:** Diversity and distribution of plants along elevation and their controlling factors; responses of plant distributions to climate change; forest exploration, plant identification and their documentation

**Ecosystem Ecology:** biomass, productivity and nutrient cycling in tropical forests; role of phosphorus and mycorrhizae in litter decomposition; responses of litter decomposition to climate change

**Restoration Ecology:** Ecological restoration of coal mine spoils

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## PUBLICATIONS

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**Kumar A**, Patil M, Kumar P, Bhatti RC, Kaur R, Sharma NK, Singh AN. 2021. *Mallotus philippensis* (Lam.) Müll. Arg.: A review on its Pharmacology and Phytochemistry. *Journal of Herbmed Pharmacology*, 10(1): 31-50. DOI: [10.34172/jhp.2021.03](https://doi.org/10.34172/jhp.2021.03)

**Kumar A**, Patil M, Kumar P, Bhatti RC, Kaur R, Sharma NK, Singh AN. 2020. *Mallotus philippensis* (Lam.) Müll. Arg.: A comprehensive review on traditional uses. *Ethnobiology and Conservation*, 9(19): 1-44. DOI: [10.15451/ec2020-05-9.19-1-44](https://doi.org/10.15451/ec2020-05-9.19-1-44)

- Kumar A**, Patil M and Singh AN. 2020. Siwalik, Shivalik, Shiwalik or Sivalik: Which one is an appropriate term for the foothills of Himalayas? *Journal of Scientific Research*, 64(1): 1-7. DOI: [10.37398/JSR.2020.640101](https://doi.org/10.37398/JSR.2020.640101)
- Kumar P, **Kumar A**, Patil M, Sharma NK, Singh AN. 2020. Plant Diversity Development Under Planted Woody Species on Coal Mine Spoil in a Dry Tropical Environment, India: A Case Study. *Journal of Ecological Engineering*, 21(2): 228-243. DOI: [10.12911/22998993/116330](https://doi.org/10.12911/22998993/116330)
- Patil M, **Kumar A**, Kumar P, Cheema NC, Kaur R, Bhatti R, Singh AN. 2020. Comparative litter decomposability traits of selected native and exotic woody species from an urban environment of north-western Siwalik region, India. *Scientific Reports*, 10:7888. DOI: [10.1038/s41598-020-64576-2](https://doi.org/10.1038/s41598-020-64576-2)
- Patil M, **Kumar A**, Kumar P, Singh AN. 2020. Litter decomposability traits and their linkage with the cycling of nutrients in the forest ecosystems under the lens of climate change: A conceptual overview. *Advances in Zoology and Botany*, 8(3): 269-277. DOI: [10.13189/azb.2020.08032](https://doi.org/10.13189/azb.2020.08032)
- Kumar A**, Yadav R, Patil M, Kumar M, Zhang L, Kaur A, Sharma S, Hussain S, Tokas D, Singh AN. 2020. Sustainable Management of National parks and Protected areas for Conserving Biodiversity in India. In: *Advances in Forest Management under Global Change* (eds. Zhang L). IntechOpen Limited, London, UK. ISBN 978-1-83968-307-7. DOI: [10.5772/intechopen.92435](https://doi.org/10.5772/intechopen.92435)
- Kumar A**, Patil M, Kumar P, Singh AN. 2020. Litter decomposability traits as a tool for plant invasion in an urban environment of north-western Siwalik region, India. In *Proceedings of Punjab Science Congress*, Feb. 7-9, 2020, PAPER ID-YAP-02, pp.



## PRESENTATIONS AND ASSIGNMENTS

- Poster Presentation**, “Plant response to Climate change: Herbarium can act as a tool for future research on plant-climate interactions”. 2<sup>nd</sup> *National Conference on Climate Change: Agriculture, Biodiversity and Human Health*. CSIR-National Botanical Research Institute, Lucknow, Uttar Pradesh. 22-23 February 2020. Abstract ID: PP-08. 40 p.
- Paper Presentation**, “Litter decomposability traits as a tool for plant invasion in an urban environment of north-western Siwalik region, India”. 23<sup>rd</sup> *Punjab Science Congress*.

**Poster Presentation**, “Floral Mimicry in Orchids: A Fascinating Phenomenon”. National Conference – Cum – Workshop on Recent Trends in Biology, Culture, Conservation, Commercialization, and Sustainable Utilization of Medicinally and Floriculturally Important Orchids. 24-26 March 2017.

**Assignment**, Inventorisation of more than 150 plants collected Mussoorie hills during the excursion trip. Panjab University, Chandigarh. 2017.

**Assignment**, Trees of Panjab University Campus: Latest Accepted Botanical Names, Synonyms, Common Names and their Uses. Panjab University, Chandigarh. 2016.

**Assignment**, Extinct, Critically Endangered, Endangered, Threatened and Vulnerable Plants of India from IUCN Red list. Panjab University, Chandigarh. 2016.



## EXPERTISE, SKILLS AND TRAININGS

### *MOOC Specializations*

**GIS, Mapping, and Spatial Analysis.** 05 December 2020. *University of Toronto, Canada.*

This 4-course online specialization covered how to find, create, evaluate, filter analyse spatial relationships of GIS data. Further, it included how to design an effective map, how to work with satellite imagery, and how to effectively present the analyses in a web-based story map in the capstone course. [[View Certificate](#)].

**Data Science.** 25 November 2020. *John Hopkins University, USA.* This 10-course online specialization comprised of two specializations of 5-course each, namely **Data Science: Foundations using R** [[View Certificate](#)] and **Data Science: Statistics and Machine Learning** [[View Certificate](#)]. The first sub-specialization covered the foundational concepts and tools for the data science pipeline including how to use the tools of the trade (The Data Scientist’s Toolbox), think analytically about complex problems (R Programming), manage large data sets (Getting and Cleaning Data), create visualizations (Exploratory Data Analysis), and publish reproducible analyses (Reproducible Research). The latter sub-specialization covered the statistical inference, regression models, machine learning, and the development of data products. In the final Capstone Project, all learned skills were applied by building a data product using real-world data. [[View Certificate](#)]

**Statistics with R.** 06 November 2020. *Duke University, USA*. This 5-course online specialization covered how to analyse and visualize data in R, create reproducible data analysis reports, perform frequentist and Bayesian statistical inference, model data to understand natural phenomena, make data-based decisions and communicate statistical results effectively. [[View Certificate](#)]

**Academic English: Writing.** 04 November 2020. *University of California, Irvine, USA*. This 5-course online specialization covered the basics of academic essay writing including grammar and punctuation, academic language, citing sources in different formats and developing a good research paper. [[View Certificate](#)]

### *MOOC Courses*

**Research Data Management and Sharing.** 26 October 2020. *University of North Carolina at Chapel Hill, USA and University of Edinburgh, Scotland, UK*. This 5-week online course covered an introduction to research data management and sharing. Specifically, it included the management plans, organization, documentation, storage and security of research data. Further, it introduced the impetus and importance of archiving and sharing data as well as how to assess the trustworthiness of repositories. [[View Certificate](#)]

**The Sustainable Development Goals – A Global, Transdisciplinary Vision for the Future.** 05 October 2020. *University of Copenhagen, Denmark*. This 3-week online course covered a thorough introduction to the Sustainable Development Goals (SDGs), specifically what they are, how progress can be measured, and how the SDGs are relevant for the management of the global systems supporting humanity. [[View Certificate](#)]

**Introduction to Algae.** 26 July 2020. *University of California San Diego, USA*. This 5-week online course covered what algae are, why they are important, and why we are interested in them for both their environmental benefit, as well as their use for products. [[View Certificate](#)]

**Mountains 101.** *University of Alberta, Canada*. 15 July 2020. This 12-lesson online course covered an interdisciplinary field of study focusing on the physical, biological, and human dimensions of mountains. [[View Certificate](#)]

**Introduction to Systematic Review and Meta-Analysis.** *John Hopkins University, USA*. 06 July 2020. This 6-week online course covered introductory methods to perform systematic reviews and meta-analysis particularly for clinical trials. [[View Certificate](#)]

**Ecosystem Services: A Method for Sustainable Development.** *University of Geneva, Switzerland.* 05 July 2020. This 5-week online course covered scientific (technical), economic, and socio-political dimensions of the ecosystem services concept through a mix of theory, case-studies, interviews with specialists and a serious-game. [[View Certificate](#)]

**Understanding Research Methods.** *University of London and SOAS University of London, England.* 18 June 2020. This 4-week online course outlined the fundamentals of doing research. [[View Certificate](#)]

**Ecology: Ecosystem Dynamics and Conservation.** *American Museum of Natural History and Howard Hughes Medical Institute, USA.* 17 June 2020. This 5-week online course covered how scientists study ecosystems, and investigate the complex array of factors that inform management efforts using a system thinking lens through a case study on Mozambique's Gorongosa National Park. [[View Certificate](#)]

**Biological Diversity (Theories, Measures and Data sampling techniques).** *National Research Tomsk State University, Russia.* 13 June 2020. This 6-week online course covered the theories behind biological diversity evolution and dynamics, methods for diversity calculation and estimation, and data sampling techniques. [[View Certificate](#)]

**Academic Information Seeking.** *University of Copenhagen and Technical University of Denmark, Denmark.* 09 June 2020. This 21-lecture online course covered the basic methods and techniques for carrying out a comprehensive literature including search strategies, evaluation techniques, documentation of search process and citation of sources. [[View Certificate](#)]

### *Trainings and Workshops*

**Botanical Nomenclature Course.** *Botanical Survey of India, Shillong, India.* 27-31 January 2020. This 5-day training course covered the rules and regulations described in the International Code of Nomenclature for algae, fungi, and plants (Shenzhen Code 2018). [[View Certificate](#)]

**Hands-On Training Program on Basic and Advanced Analytical Instrumentation in Plant Physiology.** *CCS Hisar Agricultural University, Hisar, India.* 10-11 January 2019. This 2-day training program demonstrated the handling of various instruments like leaf area meter, weather station, chlorophyll meter, pH meter, hygrometer, etc. [[View Certificate](#)]

**Classical and Modern methods in Plant Taxonomy and Biosystematics.** *National Botanical Research Institute (CSIR-NBRI), Lucknow, India.* 14-21 December 2018.

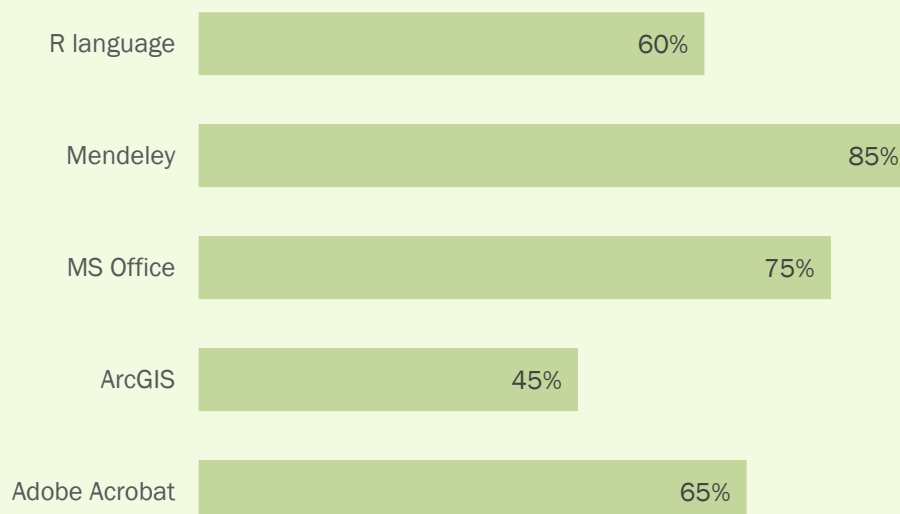
This 8-day training course covered various methods of identification of plant groups including lichens, algae, bryophytes, pteridophytes, gymnosperms and angiosperms. [[View Certificate](#)]

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## SKILLS

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**Analytical and Statistical:** Descriptive Statistics, Inferential Statistics (Hypothesis testing), Correlation and Regression analysis, Machine Learning and introductory Bayesian Statistics.

**Computer:** Mapping and Spatial data analysis: ArcGIS; MS Office: MS Excel, MS PowerPoint, MS Word; R programming language; Reference management: Mendeley; Species distribution modelling by MaxEnt and DIVA-GIS; Statistics and Graphics: GraphPad, PAST, Sigma Plot, and SPSS.

**Field and Practical:** Forest survey and field sampling; Plant species inventorisatation and documentation; Herbarium preparation; Free hand sectioning of plant materials, their staining and Light microscopy; Chromatography: Paper and Thin Layer Chromatography; Bacterial culture, Plasmid isolation, transformations; Agarose gel electrophoresis, DNA Elution from gel; UV/VIS Spectrophotometry; Drawing diagrams and illustrations; photographing



## LEADERSHIP

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Department Representative	Department of Botany, Panjab University, Chandigarh	2016 - 2017
Class Representative	Arya PG College, Panipat	2012 - 2015
Mess Representative	Jawahar Navodaya Vidyalaya, Panipat	2010 - 2011

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## MISCELLANEOUS

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### *Languages*

**English:** Intermediate Listener and Speaker, Advanced Reading and Writing

**Hindi:** Native Language

**Kannada:** Intermediate reading and writing

### *Extra-curricular Activities*

**Scouts and Guides:** *Rajya Puraskar* awardee in Scout and Guides and participated in several camps and activities.

**Science Essay Writing and Quiz competitions,** participated in several college-, district-, zonal- and state-level science essay writing and quiz competitions

**Drawing and painting competitions,** participated in several college-, district-, zonal- and state-level drawing and painting competitions

**Sports,** participated in Badminton, Carrom, Chess, Cricket and Table Tennis competitions

**Cultural Activities,** Theatre, Singing, Haryanvi Drama, Haryanvi Raagni (local folk songs)

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## REFERENCES




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