

# **BOTANY HORTICULTURE & RESEARCH OF CHRYSANTHEMUM**



**Prof. Dr. Manoj Nazir  
Dr. Barkha Sigh  
Dr. Anju Rani  
Ridhima Kaul**



# BOTANY HORTICULTURE AND RESEARCH OF CHRYSANTHEMUM.

**First Edition**

## **Authors**

Prof. Dr. Manoj Nazir  
Dr. Barkha Singh  
Dr. Anju Rani  
Ridhima Kaul



**Title of the Book:** Botany Horticulture and Research of Chrysanthemum.

**First Edition - 2025**

**Copyright 2025© Authors**

**Prof. Dr. Manoj Nazir**, Reputed Floriculture Scientist.

**Dr. Barkha Singh**, Assistant Professor of Botany, Pt. Jwala Prasad Upadhaya Govt., College, Patna, Korea, Chhattisgarh.

**Dr. Anju Rani**, Professor and Dean, Faculty of Life Sciences, HRIT University, Merta Ghaziabad.

**Ridhima Kaul**, Pursuing M.Sc of Biotechnology, Central University of Jammu.

No part of this book may be reproduced or transmitted in any form by any means, electronic or mechanical, including photocopy, recording or any information storage and retrieval system, without permission in writing from the copyright owners.

#### **Disclaimer**

The authors are solely responsible for the contents published in this book. The publishers don't take any responsibility for the same in any manner. Errors, if any, are purely unintentional and readers are requested to communicate such errors to the editors or publishers to avoid discrepancies in future.

**ISBN: 978-93-7020-390-7**

**MRP: Rs. 170/-**

#### **Publisher, Printer & Distributor:**

Selfypage Developers Pvt Ltd.,  
Pushpagiri Complex,  
Beside SBI Housing Board,  
K.M. Road Chikkamagaluru, Karnataka.  
Tel.: +91-8861518868  
E-mail: info@iipbooks.com

**IMPRINT: IIP Iterative International Publishers**

#### **For Sales Enquiries:**

Contact: +91- 8861511583  
E-mail: sales@iipbooks.com

# *Preface*

Chrysanthemums are herbaceous perennial plants and consists of about 30 species that are found in nature primarily grown as ornamental but one species is used to produce pyrethrum, an insecticide. This book, Botany, Horticulture and Research of Chrysanthemum has been written to solve the problems faced by floriculture students in order to know about this ornamental flower in detail. We have attempted to describe this floriculture crop systematically to enhance the know how about this flower.

*Prof. Dr. Manoj Nazir*  
*Dr. Barkha Singh*  
*Dr. Anju Rani*  
*Ridhima Kaul*

## *Acknowledgement*



*(Sh. Romesh Khosa)*

This book is Dedication to my first officer Sh. Romesh Khosa under whom I started my journey in the field of Agriculture Science. He is among one officer who inculcated research in my mind.

# *Content*

1	Botany behind Chrysanthemum	1
2	Micronutrient Disorders	26
3	Varieties	29
4	Origin & History & Classification	41
5	Breeding and Crop Improvement	47
6	Diseases of Chrysanthemum	69
7	Significance of Yellow, Violet, Pink, Orange, Blue, Japanese Chrysanthemum	85
8	Introduction	91
9	Horticulture of Chrysanthemum	115
10	Research on Chrysanthemum	131



# ABOUT AUTHORS



**Prof. Dr. Manoj Nazir** is a reputed floriculture scientist who has devoted 33 years of his services in boosting floriculture industry in India, especially in cut flower by promoting gladiolus in India to boost economic scenario of marginal farmers. He has bred 25 varieties in Gladiolous, 3 varieties in chrysanthemum, one variety in Daffodil, and 3 varieties in Freesia. Dr Manoj has 250 Research publications, 25 books, 10 RADIO talks, and T.V Talks. Served in Jammu Kashmir for 30 years and then for about a year as Director Research, Shobhit University, Meerut and now Associate Director Rudraksha Project, Dharamshalla. Dr Manoj has attended almost 50 International conferences in India as well as abroad, recently he has presented his research in Gladiolous at international conference in Kandhar Afghanistan. Born in Kashmir amid blooming Daffodils Prof Manoj is now studying Electromagnetic properties of Rudraksha to cure various human diseases. Received almost fifty prestigious awards till date.



**Dr. Barkha Singh** is a distinguished academic with over 20 years of teaching experience in botany, currently serving as an Assistant Professor at Pt. Jwala Prasad Upadhyay Government College, Patna, Korea, Chhattisgarh. With a strong passion for plant sciences, she has made substantial contributions to the field through her research, publishing 12 papers in reputed journals that explore various aspects of botany and floriculture. A dedicated educator, Dr. Singh combines her extensive knowledge with an unwavering commitment to fostering academic excellence among her students. She is a lifetime member of Corm: The Journal of Floriculture, underscoring her active involvement in the scientific community and her dedication to the advancement of floriculture studies. Born on 22nd October 1973, Dr. Singh exemplifies a blend of scholarly rigor and a deep passion for education and research, making her a respected figure in her field.



**Dr. Anju Rani** is currently working as Professor and Dean, Faculty of Life Sciences, HRIT University, Morta Ghaziabad. She has achieved her Doctorate degree in Botany (Microbiology & Plant Pathology) in 2008 and has more than 17 years academic and research experience. She has 64 research publications and reviews in Scopus, Web of Science, peer reviewed National as well as International Journals. She has received NGT Research Excellence Award in 2024, Young Women Scientist Award & Excellence in Research (Scientist) Award in 2017, Best Plant Pathologist -2019 Award, Fellow Award (FSPR – 2021) and Best Academician Award-2023 in different International Conferences. She has published five books including Applications of Nanotechnology: An Introduction, Laboratory Experiment in Microbiology, Plant Genetics, Disease and Insect Resistance in Plants, Pathology, Mycology and Plant Biotechnology published by National publishers. She has four book chapters publishes by Springer International Publishing Switzerland, USA and IGI Global. She has 4 patents; two National & two International. She is the life member of many National Societies. Her active areas of research are Biotechnology, Mycology, Microbiology and Plant Pathology, Nanotechnology.



**Ridhima Kaul** is a dedicated researcher, educator, and award-winning scientist currently pursuing her M.Sc. in Biotechnology at the Central University of Jammu. She graduated with a B.Sc. in Biotechnology from Govt. College for Women, Parade, Jammu, where she developed expertise in molecular biology, bioinformatics, and cutting-edge laboratory techniques like PCR and cell culture. Passionate about advancing science, Ridhima has contributed to diverse research projects, including studies on diabetes-induced hallucinations, mitochondrial dysfunction, microbial diversity, and hybrid plant creation, showcasing her innovative approach to addressing scientific challenges. Her contributions have earned her prestigious accolades, including the Young Emerging Scientist Award by GABELS and the Young Scientist Award by InSc. As a member of the editorial board for the NAAS-rated CORM Journal of Floriculture Research, Ridhima is equally committed to sharing knowledge and fostering responsible research. Her drive to excel reflects her vision of creating a meaningful impact in the field of biotechnology.



Selfpage Developers Pvt Ltd

E-ISBN: 978-93-7020-390-7



9 789370 203907

MRP: Rs. 170/-