

PEST AND SOIL MANAGEMENT OF HORTICULTURAL CROPS



■ S.K. SINGH ■ D.K. SINGH

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ABOUT THE AUTHOR

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Dr. D.K. Singh, is a recipient of award from Chief Minister of Rajasthan for best popular article and best worker award from Art, Culture and Tourism Minister of Rajasthan in the year 2002 and 2003 respectively. He also got the award from the state forest department of Rajasthan for production and protection of plants through scientific techniques and book prize award from the C.S.A. University of Agriculture and Technology, Kanpur (U.P.), where he did Bsc. (Ag. and AH) and MSc. (Ag.) Horticulture in 1998 and 1992 respectively. He obtained his doctorate degree from the G.B. Pant University of Agriculture and Technology, Pantnagar, Uttranchal in 1996 under the guidance of eminent horticulturist Dr. Sant Ram. He was awarded senior research fellowship from I.C.A.R., New Delhi during Ph.D. Programme. Dr Singh started his carrier in 1995 as Assistant Agriculture Research Officer (Horticulture) at Government Agriculture Research Station, Hanumangarh Town, Rajasthan. Presently he is Assistant Professor, Horticulture at Krishi Vigyan Kendra, Anta, Baran under, M.P. University of Agriculture and Technology, Udaipur.

The author has published more than 125 research papers and popular articles in various journals and magazines on various aspects of horticulture besides two bulletins, one compendium, 5 folders, one pamphlet, krishi calender and krishi diary. He also evaluated the several research paper and as a expert to judge the different flower, fruit and vegetables exhibitions. He participated in many national and international symposium, workshop and training programmes. He disseminated his technologies several times through television and radio.

He has distinguished himself as an author of book 'Hi-tech Horticulture' and 'Triazole Compounds in Horticulture' and popular of research technologies in international plateform.

S.K.SINGH

Dr. S.K. Singh obtained his doctorate degree in Entomology from G.B. Pant University of Agriculture and Technology, Pantnagar in 1999 and under graduate and post graduate from C.S.A. University of Agriculture and Technology, Kanpur. The doctoral research of Dr. Singh was carried out on 'Biology and Management of Termite in Mango' under the guidance

of Dr. Gajendra Singh. He was served as a Senior Research Fellow of UPDASP of G.P.P.U.A. & T., Western Campus, Modipuram, Meerut, U.P. from 1999–2000 and Research Associate at IIPR, Kanpur, U.P. from 2000–02. Dr. Singh has to his credit more than 25 publications, most of which on termite and pulse crops. Presently he is working as a lecturer in the department of Entomology at B.N.V.P.G. College, Rath, Hamirpur with officer Incharge of N.S.S.

ABOUT THE BOOK

Integrated pest, disease and soil management is a management system that in the context of associated environment and population dynamics of pest species, disease species and soil, utilizes all suitable techniques and methods in as compatible a manner as possible and maintains pests, disease at levels below those causing economic injury. It is the integration of all suitable management techniques with natural regulating and limiting elements of the environment. The book consist of chapter including integrated pest management, pest of tropical, subtropical and temperate fruits, pest of plantation crops, spices crops, ornamental plants and vegetables, physiological processes as affected by water stress, disease management of tropical, subtropical fruit, temperate fruits, plantation crops, vegetable crops, ornamental and flower crops. In soil management part of book consist of chapter including integrated nutrient management, leaf nutrient norms in fruit crops, soil fertility and productivity, biodynamics, vermiculture, etc. Presentation of tables, figures attracts more to the readers and even in a quick look one can get vital information. This book covers all aspects of horticulture syllabi of under graduate and post graduate students. The book is written in a simple, easy to understand language which will be highly useful to the students, teachers, extension personnel, scientists and progressive horticulturist.

PREFACE

Integrated Pest Management (IPM) aims at judicious use of cultural, biological, chemical, host plant resistance/tolerance, physical-mechanical control and regulatory control methods. Agenda 21 of the United Nations Conference on Environment and Development (UNCED) at Rio de Janeiro in June 1992 indentified IPM in agriculture as one of the requirements for promoting sustainable agriculture and rural development. So the goal of sustainable agriculture should be to maintain production at necessary levels to meet the increasing aspiration of an expanding world population without degrading the environment by using more and more chemicals. Biological control also assumes importance in sustainable agriculture and organic farming. However, it has several inherent limitations like the availability of natural enemies in sufficient numbers to utilize on a large scale. Secondly, almost all parasitoids and predators do not integrate with insecticides. Therefore, there is a urgent need to develop natural enemies tolerant to multi-pesticidal groups. It is further, necessary to encourage commercial insectaries, which can supply quality natural enemies to farmers at a very short notice. This also calls for developing appropriate shipment technologies and stage of transportation.

Besides these, there are pesticidal of biological origin, e.g. viruses, bacteria, fungi, bacloviruses, viz. Nuclear Polyhdrosis Virus (NPV) and Gramilosis Viruses (GV) are important and specific in infecting only certain closely related species of caterpillars attacking various crop plants. e.g. tomato and potato. Use of commercial formulation of *Bt* has been effective in controlling shoot borer of ginegr, turmeric and *Metarrhizium* sp. and *Beauveria* sp. in control of root grub of cardamom.

Integrated Nutrient Management (INM) refers to maintenance of soil fertility and plant supply to an optimum level for sustaining the desired crop productivity through optimization of the benefits

from all possible sources of plant nutrients in an integrated manner. It is a holistic approach where we first know what exactly is required by the plants for optimum level of production; in what different forms these nutrients can be applied in soil; at what different timings, by best possible method, and how best these forms can be integrated to obtain highest productivity with efficiency at economically acceptable limits in environment-friendly way. The decline in crop yield due to continuous use of inorganic fertilizer has been observed throughout the world. Therefore increasing need is being felt to integrate nutrient supply with organic sources to restore the health of soil. Bio-fertilizer offer an economically attractive and ecologically sound means of reducing external inputs and improving the quality and quantity of internal resources. These are less expensive, eco-friendly and sustainable. The beneficial microbes in the soil, which are of greater significance to horticultural situation, are the biological nitrogen fixers, phosphate solubilizers and the mycorrhizal fungi. To fulfil the requirement of undergraduate and post graduate horticulture and entomology course curriculum, this book 'Pest and Soil Management of Horticultural Crops', is being brought out.

The present book is an effort in this direction in which the authors has attempted to describe the pest management of tropical and subtropical fruits, temperate fruit, plantation crop, spices crops, ornamental plants, vegetable crops, water stress and disease management of tropical, subtropical, temperate fruit crops, vegetable crops, ornamental and flower crops, etc. Besides, the above topics the author has includes the integrate nutrient management, leaf nutrient norms in fruit crops, soil fertility and productivity, organic farming, vermicomposting and biodynamics, etc. All the latest research findings on various aspect of horticulture have been incorporated in the text. Presentation of tables, figures attracts more to the readers and even in a quick look one can get vital information. The book is written in a simple, easy to understand language that will be highly useful to the students, teachers, scientists, extension personnel and progressive horticulturist.

We take this opportunity to gratefully acknowledge the contribution made by various persons in the preparation of this book. We warmly acknowledge the various sources and publications from which valuable materials for this book has been drawn. This book is being dedicated to late Dr. Sant Ram and late Dr. V.N. Maurya who guided the junior author in Ph.D. and M.Sc. (Ag.) respectively at G.B.P.U.A & T., Pantnagar and C.S.A.U.A. & T. Kanpur. We are deeply indebted to the entire staff of Krishi Vigyan Kendra, Anta for the help rendered by them in the preparation of this book. I express my sincere appreciation to Dr. A.R. Singh, Dr. R.P. Singh, Dr. G.S. Gaur, Dr. G.N. Singh, Dr. H.S. Shukla, Dr. O.P. Chaturvedi of Horticulture Department of C.S.A. University of Agriculture and Technology, Kanpur and Dr. N.P. Singh, Dr. J.P. Tiwari, Dr. C.P. Singh of Department of Horticulture of G.B. Pant University of Agriculture and Technology, Pantnagar, who inspired us to write this book and gave valuable suggestion from time to time. We take this opportunity to express my sincere thanks and gratitude to all those who have made valuable suggestions to enhance the utility of the book and also wish to acknowledge and express my sincere thanks and gratitude to Prof. L.L. Somani, Director, Resident Instructions, M.P. University of Agriculture and Technology, Udaipur for providing the necessary encouragement to complete this book.

It is hoped that the book 'Pest and Soil Management of Horticultural Crops' will prove to be of immense value not only to research workers but also to the teachers, students, planner, farmers and individuals who are desirous of increasing quality fruit and seed production in horticultural crops. Besides it is also expected to be useful to the horticulturists all over the world, seeking latest information on horticultural technologies.

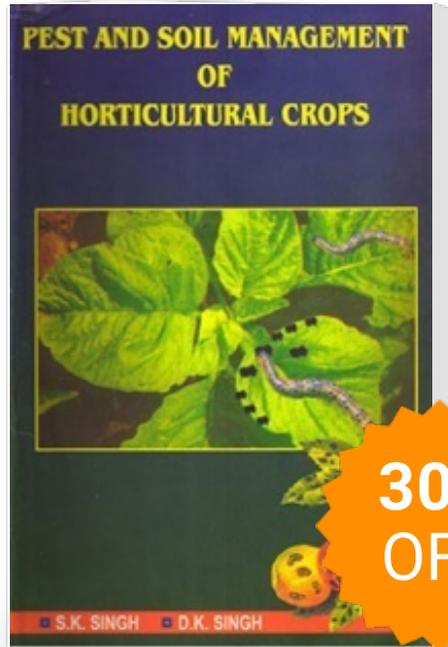
S.K. Singh
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