

# VIRTUOUS PLANTS



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*Dedicated to*

1. Late Shri Brij Bihari Lal (Father)
2. Late Mrs. Sheelwati Devi (Mother)
3. Late Shri Bhagwan Prasad (Uncle)

– Dr. P. K. Srivastav





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### FOREWORD

A great diversity of plants exists in ecosystem which has an immense impact on the sustainable development of human beings. Plants are an inseparable part of our day-to-day life and provide us food and fodder, fuel, fiber, clothes, dyes, spices, herbs, etc. A variety of plants are economically, medicinally and ornamentally important. Overexploitation, human interventions, deforestation etc., have posed a threat to the existing plant biodiversity. The lack of adequate knowledge of the plant genetic resources, conservation needs and their sustainable utilization poses a challenge threat to the existing natural ecosystems and put them at peril.

The authors in the book “Virtuous Plants” have compiled important information on the rich plant biodiversity, with a view to create awareness to the public at large, which will in turn facilitate sustainable utilization and conservation of the natural genetic resources. The authors have provided background information on 92 important plants detailing their various facets which are relevant to their identification and cultivation. This knowledge will not only help in better understanding of our limited natural resources but also ensure their meaningful utilization over a long period of time.

It is also to mention that this book summarizes important aspect of the plants viz., English and Hindi name besides Botanical name, systematic position, geographical distribution, habit and habitat, description of vegetative and reproductive characters besides availability/lack of them adds to the scientific understanding of the plant in question but also helps students, teachers, scientists, foresters, naturalists and industrialist in formulating operational and conceptual framework to facilitate sustainable utilization and conservation measures.

The treatment of every plant in the book reflects the author(s) clarity of information and keenness to illustrate through quality pictures. One of the authors, Dr. P.K. Srivastav, my worthy senior and a dedicated botanist with vast on and off field experiences has done an excellent job of compiling useful information on several important plants of great importance. This book is destined to play a major role in generating enthusiasm, motivation and impart knowledge to plant scientists of India, who are bound to make an impact on our rich wealth of “Virtuous Plants”.

S. R. Rao





## PREFACE

The importance of plants for environmental protection, ornamentation and as a source of cereals, vegetables, fruits, spices, condiments, oils, fuel, fodder, fiber, paper, timber, tannins, resin, dyes, other raw materials for various industries and medicines has been realized since the dawn of various civilizations. History of association of plants with human beings has lost in antiquity. The indigenous societies of various regions across the globe discovered various uses of plant resources around them. Such traditional knowledge was based on their necessities, instincts, observations, trial and error and above all on long experiences. During Egyptian and Mesopotamian era, science of medicine evolved for the first time and showed a distinct sign of breaking free from complete dependence on Gods. Simultaneously, China developed Acupuncture, the remedial procedure to regulate the flow of life forces called "Chi" through the twelve meridians in the body for achieving balance of the two elements "Yin and Yang". Similarly, the agricultural village based societies of the Indo-Aryan civilizations gave birth to "Ayurveda", the natural herb based remedial measures in India. The importance of plants as a source of medicines has been realized since the time of the "Rig Veda" which is supposed to be 5000 years old. The use of plants as a source of medicines has developed extensively in different systems of medicines such as Ayurveda, Unani, Allopathy, Homeopathy and others. "Ayurveda" the science of life is still considered as a safe system of medicines as most of their preparations are herbal based and harmless even if used for longer periods in proper dose. The supply base of 90% herbal raw drugs used in the manufacture of medicines in these systems comes largely from the wild species of higher plants. Indian sub-continent has more than 3000 species of medicinal plants, out of which approximately 600 find major use in herbal drugs and medicines. The demand for Ayurvedic medicines is increasing. The international market of medicinal plants related trade of US \$ 60 billion/year is growing at the rate of 70% annually. Although China and India represent major sources of medicinal herbs, India presently holds only 2.3% share of global market, which shows tremendous prospects and potentialities of medicinal and aromatic plants for building India a developed nation.

The diversity of plant resources promises numerous discoveries of useful products either already identified or yet to be identified. They serve as host plants of useful silkworms and Lac insects also. They are source of recreation and aesthetic and religious pleasures to many people. They are deeply embedded in folklore and our shared heritage. They inspire works of

art and expressions in language and figure prominently in religion and legends. This great plant wealth has intrinsic value to our existence and commerce. Yet, it is finite and hence needs judicious sustainable exploitation as well as conservation for posterity. Today we are facing the greatest challenge from gene erosion as only 30 plants provide 90% of global nutritional requirements as against 1500 wild species used by ancients. Over exploitation of timber and fruit trees, medicinal plants, flowering/foilage ornamental plants, orchids, cacti and other succulent plants has posed a severe threat to plant diversity. As pointed out by International Union for Conservation of Nature and Natural Resources (IUCN) as many as 60,000 plant species may be in danger of extinction or serious gene erosion during the next 30-40 years. Hence, it is every body's concern to conserve plant diversity through sustainable utilization. There should be a call to all people to save the plants that save us and for achieving this Herculean task a mass awareness programme is utmost need of the hour. The first step in this endeavour would be to educate our people about our plant resources.

Several books have been published separately on vegetables, species & condiments, timber & fodder and flowering trees, cereals, pulses, fruits and medicinal and aromatic plants. It is very difficult as well as time consuming for an ordinary man to go through all these books for acquiring knowledge in a nutshell. Further, it is also observed frequently that various organs of the same plant have been used as food, fuel, fodder, fiber and medicine for treatment of various human ailments. Therefore, an attempt has been made in this treatise to deal with various aspects viz., names in different languages, classification, morphological features, flowering, fruiting, methods of propagation and various uses of 92 virtuous plants of Indian subcontinent.

It is hoped that our such attempt will facilitate generation of awareness among the general public, industrialists, policy makers, administrators, scientists, educationists, students and media personnel about these natural resources and help their judicious sustainable utilization in our country.

**Authors**

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Last but not least, we are also grateful to M/s Scientific Publishers (India), Jodhpur for publishing and adding this book in the form of a drop to the ocean of knowledge.

**Dr. P. K. Srivastav**  
**Dr. M.K. Tayal**



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# INTRODUCTION

The variability among living organisms and the ecosystem complexes in which they occur has great value for the existence of human beings, industries and commerce. Out of estimated 12.5 million living forms on our earth only less than 2 million have been identified and studied. In angiosperms (flowering plants), only 2,50,000 species have been identified so far. Of these, only 3000 have been regarded as a food source and around 200 plant species have been domesticated for food purposes. India has identified 17,500 species of flowering plants.

Plants protect environment, beautify our surroundings and serve fuel, fodder, fiber, paper, timber, tannins, resin, clothes, medicines, dyes and silks. In international trade, ornamental plants are recognized as an important commodity and their cultivation surpasses the variety of plants commonly grown for food around the world. The importance of medicinal, aromatic and silk producing sericegenous plants has also been realized now. Plant diversity as a global resource has immense potentials for development of natural products for sustainable development of human beings. But, heavy exploitation combined with massive habitat destruction has led to the decline of major commercial species. The "Earth Summit" at Rio-de-Janeiro suggested for 20% cut in green house gas emissions, restriction on felling of forest trees in biodiversitically rich tropical countries, measures and steps to control population and remove poverty for reducing pressure on forests, technology transfer to clean up pollutant and improve energy efficiency and conservation based sustainable development. Therefore, we must conserve life support systems or ecological processes that keep our plant fit for life through scientific understanding of species and ecosystems.

Our association with nature, particularly with trees, dates back to time immemorial since they quenched our thirst, provided us food, covered our body and provided shelter to us even when we were ignorant of agricultural crops and cultivation techniques. However, changing scenario of human civilization destroyed our relationship with nature and trees were cut indiscriminately. We had not realized that destruction of forests, trees and other plants will annul us since there would not be any agriculture for feeding, oxygen for breathing and water for drinking if there will be no forests. Hence, we will have to retrieve our past mistakes and reestablish our friendship with nature again, if we want to survive and inherit a balanced ecosystem to our descendents besides improving our economy by sustainable development through balanced exploitation of our natural resources. The general public should also follow the principles of

conservation and sustainable development through judicious use of biological resources. A mass awareness programme is utmost need of the hour for achieving this Herculean task and the first step in this endeavour should be to educate our people about our plant wealth. It is in this context we have written this book on “**Virtuous Plants**”.

The book contains scientific names, popular names in different international/national/regional languages, legendary/historical significance, systematic position according to three systems of plant classification viz., Bentham & Hooker, Engler & Prantl and Hutchinson; geographical distribution, morphological features, flowering, fruiting, methods of propagation/cultivation and various uses of 92 virtuous plants of Indian subcontinent in agriculture, forestry, pharmaceutical, timber, horticulture, tannin and allied industries, if any. While all attempts were made to compile maximum information on these plants hitherto scattered in various journals, magazines and books, lapses might have crept in unknowingly.

It is hoped that the book will create interest even among the common man and invite attention of all those concerned to conserve and facilitate sustainable utilization of these natural resources through conservation measures and integration of various industries besides helping students, teachers, scientists, foresters, naturalists and industrialists in formulating various projects and farmers for increasing their income through plantation and adoption of various schemes/ avenues related to these plants.

**Authors**