# UNVEILING OF UNDEREXPLOITED HORTICULTURAL CROPS

**Editors** 

Dr. Eggadi Ramesh Dr. Vangapandu Thriveni Dr. S. Deepti Dr. Anant Tamang



**NEW DELHI PUBLISHERS** 

New Delhi, Kolkata

## **Contributors List**

#### Adapa Shalini Pujitha

#### PG Scholar,

Deptt. of Agricultural Extension Education, M. S. Swaminathan School of Agriculture, Centurion University of Technology and Management, Odisha-761211, India

## Aditya Pratap Singh

Assistant Professor,

Department of Plant Breeding and Genetics, School of Agriculture, GIET University, Gunupur, Odisha, India

## Ajay Kumar Prusty

Assistant Professor,

Deptt. of Agricultural Extension Education, M. S. Swaminathan School of Agriculture, Centurion University of Technology and Management, Odisha-761211, India

## Akkamahadevi Naik

Assistant Professor,

Deptt. of Agricultural Extension Education, M. S. Swaminathan School of Agriculture, Centurion University of Technology and Management, Odisha-761211, India

## Anjali Viva Minj

Department of Vegetable Science, Horticulture College, Khuntpani, India

## Anitha M

College of Horticulture, Dr. Y.S.R. Horticultural University, Venkataramannagudem, West Godavari, Andhra Pradesh – 534101, India

## Anuradha Sinha

Department of Vegetable Science, Nalanda College of Horticulture, Noorsarai 803113, Bihar, India

## **Anant Tamang**

Associate Professor, M. S. Swaminathan School of Agriculture Centurion University of technology and Management, R. Sitapur, Gajapati, Odisha-761211, India

## Anmol Giri

Assistant Professor, Deptt. of Agricultural Economics, School of Agriculture, GIET University, Gunupur, Odisha, India

## Appani Laxman Kumar

Assistant Professor, Department of Horticulture, Malla Reddy University, Telangana, India

## Aradhana Sen,

Birsa Agricultural University, Kanke Ranchi, India

## Ashok P

Horticulture Research Station, Dr. Y.S.R. Horticultural University, Venkataramannagudem, West Godavari, Andhra Pradesh – 534101, India

## Ashok Kumar

Assistant Professor,

Deptt. of Agricultural Extension Education, M. S. Swaminathan School of Agriculture, Centurion University of Technology and Management, Odisha-761211, India

## Avik Maji

Deptt. of Agricultural Extension Education, M. S. Swaminathan School of Agriculture, Centurion University of Technology and Management, Odisha-761211, India

## vi

Unveiling of Underexploited Horticultural Crops

## Bandi Anitha

Assistant Professor, Department of Horticulture, Malla Reddy University, Telangana, India

## Beera Anusha

PG Scholar, Deptt. of Agricultural Extension Education, M. S. Swaminathan School of Agriculture, Centurion University of Technology and Management, Odisha-761211, India

## Bharti Sao

AKS University Satna, Madhya Pradesh, India

## **Bheemireddy Anuradha**

Department of Vegetable Science, COH-Rajendranagar, SKLTSHU, Mulugu, Siddipet-502279, Telangana, India

## Bibhuti Bhusan Sahoo

Regional Research and Technology Transfer Station (OUAT), Bhawanipatna, Kalahandi-766001, Odisha, India

## Bibhuti Bhusan Sahoo

Dept. of Agril. Engineering Department, Centurion University of Technology and Management, Odisha, India

## Bibhuti Bhusan Sahoo

Regional Research and Technology Transfer Station(OUAT), Bhawanipatna, Kalahandi-766001, Odisha, India

## Boreddy Jayachandra Reddy

Ph. D. Research Scholar, Deptt. of Soil Sci. & Agril. Chemistry, Sher-e-Kashmir University of Agricultural Scienes and Technology, Jammu, Jammu and Kashmir-180009, India

## Chandra Surya Rao M

School of Agril. & Food Technology, Vignan's Foundation for Sci., Technology & Research, Vadlamudi, Guntur, Andhra Pradesh, India

## Chitrasena Padhy

PG Scholar,

Deptt. of Agricultural Extension Education, M. S. Swaminathan School of Agriculture, Centurion University of Technology and Management, Odisha-761211, India

## Chundru Ramya Madhuri

PG Scholar,

Deptt. of Agricultural Extension Education, M. S. Swaminathan School of Agriculture, Centurion University of Technology and Management, Odisha-761211, India

## Dibya Jyoti Mukhia

Ph.D. Scholar, Uttar Banga Krishi Viswavidyalaya, Pundibari, Dist: Cooch Behar, Pin-736165.

## **Digvijay Singh**

Dept. of Genetics and Plant Breeding, Narayan Institute of Agricultural Sciences, Gopal Narayan Singh University, Sasaram 821305, Bihar, India

## Dulam Shivaraj

Department of Vegetable Science, COH-Rajendranagar, SKLTSHU, Mulugu, Siddipet-502279, Telangana, India

## Eggadi Ramesh

Assistant Professor, Department of Horticulture, Deptt. of Agricultural Extension Education, M. S. Swaminathan School of Agriculture, Centurion University of Technology and Management, Odisha-761211, India

## **Gaurav Sharma**

Rani Lakshmi Bai Central Agricultural University, Jhansi, U.P, India

## Goskula Kiran

Dept. in Plant Pathology, B.C.K.V.V. Mohanpur, West Bengal, India

### Idemakanti Chandrakanth Reddy

Assistant Professor,

Deptt. of Agricultural Extension Education, M. S. Swaminathan School of Agriculture, Centurion University of Technology and Management, Odisha-761211, India

#### Jagarlamudi Nethra

M. Sc. (Hort.) Vegetable Science, M. S. Swaminathan School of Agriculture, Centurion University of Technology and Management, Odisha-761211, India

#### Kakali Das

Division of Vegetable Science, ICAR-Indian Agricultural Research Institute, New Delhi, India

#### Katta Sreevandana

Research Scholar, Dept. of Vegetable and Spice Crops, Faculty of Horticulture, Uttar Banga Krishi Viswavidyalaya, Pundibari, Cooch Behar, West Bengal-736165., India

#### Konathachira Sreeja

Ph.D. Scholar,

Deptt. of Plantation, Spices, Medicinal and Aromatic Crops in Bidhan Chandra KrishiViswavidyalaya, Kolkata, West Bengal, India

#### Korla Harshavardhan

Department of Agricultural Engineering, Centurion University of Technology and Management, Odisha, India

#### Koku K. Tara

Division of Vegetable Science, ICAR-Indian Agricultural Research Institute, New Delhi

#### Lalu Prasad

Ph.D scholar, Acharya Narendra Deva University of Agriculture and Tech., Kumarganj, Ayodhya, India

#### Mahesh S S N M

Department of Horticulture, Dr. YSRHU -COH, V.R Gudem, India

#### Mahendra Belagumpi

Ph.D. Scholar, Deptt. of Plantation, Spices, Medicinal and Aromatic Crops in UHS Bagalkot, Bangalore, India.

#### Malluri Sai

PG Scholar,

Deptt. of Agricultural Extension Education, M. S. Swaminathan School of Agriculture, Centurion University of Technology and Management, Odisha-761211, India

#### Md. Hasrat Ali

Professor, Department of Agril. Economics, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, West Bengal

#### Megha M

ICAR-Indian Institute of Horticultural Research, Bengaluru, 560089, Karnataka, India

#### Motapalukula Jyothi

Ph. D (Horticulture) in Vegetable Science, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra, India

#### Monalisa Panda

M.Sc. Scholar, Department of Vegetable Science, Odisha University of Agriculture and Technology, Odisha, India

#### Nimmaka Dinesh Kumar

PG Scholar,

Deptt. of Agricultural Extension Education, M. S. Swaminathan School of Agriculture, Centurion University of Technology and Management, Odisha-761211, India

vii



Unveiling of Underexploited Horticultural Crops

## Odisi Netaje

Assistant Professor, Centurion University of Technology of management, Parlakhemundi, Orissa, India

## Prashant Kalal

Assistant Professor, Department of Horticulture, Centurion University of Technology and Management, Paralakhemundi-761211 Odisha, India

## P. Preethi

ICAR-IIHR (Indian Institute of Horticultural Research, Hessaraghatta, Bengaluru, India

## P. Tanuja

Assistant Professor, Department of Horticulture, Malla Reddy University, Hyderabad Telangana, India

## Purandar Mandal

College of Horticulture (OUAT), Chiplima, Sambalpur-768025, Odisha, India

## Rahmya

Division of Vegetable Science, ICAR-Indian Agril. Research Institute, New Delhi, India

## Ramanandam G

Principal Scientist (Hort.) & Head, Department of Horticulture, Dr. YSRHU, Horticultural Research Station, Kovvur, East Godavari, Andhra Pradesh, India

## Ranjit Chatterjee

Professor, Department of Vegetable and Spice Crops, U. B. K. V. V., Pundibari, Dist: Cooch Behar, Pin – 736165., India

## Santosh D T

Agricultural Engineering Department, Centurion University of Technology and Management, Odisha, India

## Sayan Chakraborty

### Student,

Deptt. of Agricultural Extension Education, M. S. Swaminathan School of Agriculture, Centurion University of Technology and Management, Odisha-761211, India

## Salomi Suneetha DR

College of Horticulture, Dr. Y.S.R. Horticultural University, Venkataramannagudem, West Godavari, Andhra Pradesh – 534101, India

## Santhoshkumar G M

Ph. D Scholar,Deptt. of Pomology and Post-Harvest Tech.,U. B. K. V. Viswavidyalaya, Pundibari,Coochbehar, WB- 736165, India

## Sindhu V

Ph. D Research Scholar, Department of Vegetable and Spice Crops, M. S. Swaminathan School of Agriculture, Centurion University of Technology and Management, Odisha-761211, India

## Sinchana Jain N R

ICAR-Indian Institute of Horticultural Research, Bengaluru, 560089, Karnataka, India

## Sinchana Jain N. R

Division of Fruit Crops, ICAR-IIHR, Bengaluru-560089, India

## Sikha Manoharan

PhD scholar, ICAR-Indian Agricultural Research Institute , New Delhi, 110012, India

## Sirisilla Saharika

Ph.D. Scholar, Department of Fruit Science, SKLTSHU, Rajendranagar, Hydrabad, Telangana-500030, India

Contributors List

## Sunna Deepti

Assistant Professor, Centurion University of Technology of management, Parlakhemundi, Orissa, India

#### Sujatha RV

College of Horticulture, Dr. Y.S.R. Horticultural University, Venkataramannagudem, West Godavari, Andhra Pradesh – 534101, India

#### Sushmitha L C

Division of Vegetable Science, ICAR-Indian Agricultural Research Institute, New Delhi-12, India

#### Swami DV

Post harvest Technology Research Station, Dr. Y.S.R. Horticultural University, Venkataramannagudem, West Godavari, Andhra Pradesh – 534101, India

#### Swapnil

Department of Genetics and Plant Breeding, Centurion University of Technology and Management, Paralakhemundi 761211, Odisha, India

#### Vangapandu Thriveni

Department of Horticulture, Centurion University of Technology and Management, Paralakhemundi 761211, Odisha, India

#### Vanacharla Prasanna

PG Scholar, Deptt. of Agricultural Extension Education, M. S. Swaminathan School of Agriculture, Centurion University of Technology and Management, Odisha-761211, India

#### Viswanath M

Scientist, Department of Horticulture, Dr. YSRHU, Horticultural Research Station, Kovvur, East Godavari, Andhra Pradesh.

ix

## Prologue

In a world dominated by a handful of popular fruits and vegetables, there exists a vast universe of underexploited horticultural crops, waiting to be discovered and embraced. These unsung heroes of the plant kingdom, often overshadowed by their more mainstream counterparts, possess remarkable attributes and untapped potential. It is within this realm of underexploited horticultural crops that we find a hidden treasure trove of flavours, colours, and nutritional benefits.

**"Unveiling of Underexploited Horticultural Crops"** book is a heartfelt exploration of these lesser-known gems, shedding light on their diversity, cultivation, and utilization. It aims to inspire a renewed appreciation for these underutilized crops and the countless possibilities they offer to enhance our culinary experiences, improve nutrition, and foster sustainable agriculture.

Within the pages of this book, we embark on a captivating journey of discovery, unearthing the rich history and cultural significance of these horticultural wonders. We delve into their origins, exploring their native habitats and the traditional uses that have been passed down through generations. Through this exploration, we begin to grasp the profound connection between these crops and the communities that have cultivated them for centuries. We explore the abundance of vitamins, minerals, and antioxidants they contain, as well as their potential health benefits. These crops, often adapted to specific environments, offer resilient alternatives to traditional food sources, fostering food security and diversifying our diets. We explore their applications in medicinal practices. By understanding and harnessing the full range of their benefits, we can unlock new opportunities for economic growth, conservation, and ecological restoration. As you immerse yourself in the chapters that follow, you will discover a wealth of information, from cultivation techniques and post-harvest handling to culinary tips and recipes that showcase the unique flavours and textures of these underexploited crops. It is our hope that this book will serve as a catalyst for experimentation, faculties, farmers, and way to food security to embrace the abundance and diversity that these crops offer. So, let us embark on this extraordinary journey together, as we unlock the potential of these hidden treasures and celebrate the wonders of underexploited horticultural crops.

We thank to **Centurion University of Technology and Management**, Odisha for sustained support and encouragement.

## **Special Thanks to**

Prof. (Dr.) S. Eswara Reddy

Dr. M. Devender Reddy

Dr. S. P. Nanda

Centurion University of Technology and Management

## Contents

1.	Underexploited Horticultural Crops: A New Income Source for Small and Marginal Farmers Anmol Giri, Aditya Pratap Singh, Md. Hasrat Ali and Anant Tamang	1
2.	<b>Borassus – An Underexploited Crop</b> Chandra Surya Rao M, Swami DV, Anitha M, P. Preethi, Ashok P, Salomi Suneetha DR and Sujatha RV	17
3.	<b>Production technology of Long Melon</b> Anjali Viva Minj and Aradhana Sen	57
4.	Bastard Oleaster ( <i>Elaeagnus latifolia</i> L.): An Underexploited fruit Anant Tamang, Sirisilla Saharika, Avik Maji, Sayan Chakraborty and Anmol Giri	63
5.	Winged Bean: An Untapped Nutritionally Enriched Vegetable Crop Anuradha Sinha, Digvijay Singh, Swapnil and Vangapandu Thriveni	71
6.	Growing Challenges: Investigating Adverse Effect of Climate Change on Horticultural Crops Appani Laxman Kumar, Dulam Shivaraj, Bheemireddy Anuradha and Bandi Anitha	77
7.	Cultivation Practices of Protea Bharti Sao and Gaurav Sharma	93
8.	<b>Phalsa (</b> <i>Grewia asiatica</i> L.) Purandar Mandal and Bibhuti Bhusan Sahoo	103
9.	Underutilized Vegetable Crops in the Western Ghats of India Sushmitha L C, Koku K. Tara, Kakali Das and Rahmya	113
10.	Underexploited Vegetable Crops of Andhra Pradesh Katta Sreevandana, Eggadi Ramesh and Boreddy Jayachandra Reddy	131
11.	A Brief View of Under – Utilized Crop: Malabar Tamarindg Konathachira Sreeja, Mahendra Belagumpi and Goskula Kiran	139
12.	Chow Chow – An Underexploited Vegetable Crop Monalisa Panda and Lalu Prasad	149

13.	Chekurmanis ( <i>Sauropus androgynus</i> (L.) Merr) –	
	The lesser known multivitamin green Sikha Manoharan	157
14.	Water Management for Under – Exploited Horticultural Crops	165
	Santosh D T, Bibhuti Bhusan Sahoo and Korla Harshavardhan	
15.	Chamomile	181
	Sunna Deepti and Odisi Netaje	
16.	Globe Artichoke	195
	Jagarlamudi Nethra, Motapalukula Jyothi, Eggadi Ramesh and Idemakanti Chandrakanth Reddy	
17.	Vegetable Fern	199
	Dibya Jyoti Mukhia and Ranjit Chatterjee	
18.	Karonda	209
	Megha M, Sinchana Jain N R, and Prashant Kalal	
19.	Leek	217
	Sindhu V, Eggadi Ramesh and Santhoshkumar G M	
20.	Underutilised Horticultural Crops in East-Coast Districts of India	223
	Malluri Sai, Adapa Shalini Pujitha, Beera Anusha, Nimmaka Dinesh Kumar,	
	Ajay Kumar Prusty, Ashok Kumar and Akkamahadevi Naik	
21.	Role of Underutilised Vegetables and Fruits in Human Nutrition	239
	Chitrasena padhy, Vanacharla Prasanna, Chundru Ramya Madhuri and Beera Anusha	
22.	Production Technology of Sea Buckthorn	245
	Sinchana Jain N. R, Megha M and Prashant Kalal	
23.	Carambola	251
	Viswanath M, Ramanandam G and Mahesh S S N M	
24.	The Common Fig ( <i>Ficus carica</i> L.)	263
	Purandar Mandal and Bibhuti Bhusan Sahoo	