Mohammed Wasim Siddiqui, Series Editor-in-Chief
Postharvest Biology and Technology Book Series

Postharvest Biology and Technology of Horticultural Crops

Principles and Practices for Quality Maintenance

Mohammed Wasim Siddiqui, PhD Editor





POSTHARVEST BIOLOGY AND TECHNOLOGY OF HORTICULTURAL CROPS

Principles and Practices for Quality Maintenance

Edited by
Mohammed Wasim Siddiqui, PhD



Apple Academic Press Inc. | 3333 Mistwell Crescent Oakville, ON L6L 0A2 Canada

Apple Academic Press Inc. 9 Spinnaker Way Waretown, NJ 08758 USA SB 319.7 P84 2015

©2015 by Apple Academic Press, Inc.

Exclusive worldwide distribution by CRC Press, a member of Taylor & Francis Group

No claim to original U.S. Government works

International Standard Book Number-13: 978-1-77188-086-2 (Hardcover)

All rights reserved. No part of this work may be reprinted or reproduced or utilized in any form or by any electric, mechanical or other means, now known or hereafter invented, including photocopying and recording, or in any information storage or retrieval system, without permission in writing from the publisher or its distributor, except in the case of brief excerpts or quotations for use in reviews or critical articles.

This book contains information obtained from authentic and highly regarded sources. Reprinted material is quoted with permission and sources are indicated. Copyright for individual articles remains with the authors as indicated. A wide variety of references are listed. Reasonable efforts have been made to publish reliable data and information, but the authors, editors, and the publisher cannot assume responsibility for the validity of all materials or the consequences of their use. The authors, editors, and the publisher have attempted to trace the copyright holders of all material reproduced in this publication and apologize to copyright holders if permission to publish in this form has not been obtained. If any copyright material has not been acknowledged, please write and let us know so we may rectify in any future reprint.

Trademark Notice: Registered trademark of products or corporate names are used only for explanation and identification without intent to infringe.

Library of Congress Control Number: 2015936645

Library and Archives Canada Cataloguing in Publication

Postharvest biology and technology of horticultural crops: principles and practices for quality maintenance / edited by Mohammed Wasim Siddiqui, PhD.

Includes bibliographical references and index.

ISBN 978-1-77188-086-2 (bound)

- Horticultural crops--Postharvest technology.
 Horticultural crops--Biotechnology.
- I. Siddiqui, Mohammed Wasim, author, editor

SB319.7.P68 2015

635'.046

C2015-901597-9

Apple Academic Press also publishes its books in a variety of electronic formats. Some content that appears in print may not be available in electronic format. For information about Apple Academic Press products, visit our website at www.appleacademicpress.com and the CRC Press website at www.crcpress.com



00077810

Printed and bound in Great Britain by TJ International Ltd, Padstow, Cornwall

CONTENTS

	List of Contributorsxi
	List of Abbreviationsxv
	List of Symbolsxvii
	Prefacexix
	Acknowledgmentxxi
1.	Factors Affecting the Quality of Fruits and Vegetables: Recent Understandings
	Kalyan Barman, Md. Shamsher Ahmad, and Mohammed Wasim Siddiqui
2.	Advances in Non-destructive Quality Measurement of Fruits and Vegetables
3.	Advances in Conventional Breeding Approaches for Postharvest Quality Improvement of Fruits
4.	Advances in Conventional Breeding Approaches for Post-Harvest Quality Improvement in Vegetables
5.	Advances in Storage of Fruits and Vegetables for Quality Maintenance193
	G. R. Velderrain Rodríguez, M. L. Salmerón-Ruiz, G. A. González Aguilar, Mohammed Wasim Siddiqui, and J. F. Ayala Zavala
6.	Active and Smart Packaging Film for Food and Postharvest Treatment217
	Ida Idayu Muhamad, Eraricar Salleh, Nozieana Khairudin, Mohd Harfiz Salehudin, and Norsuhada Abdul Karim
7.	Advances in Postharvest Diseases Management in Fruits243 Eva Arrebola
8.	Integrated Postharvest Pest Management in Fruits and Vegetables293
	Tamoghna Saha, C. Nithya, and S. N. Ray

Flower Senescence319
Donal Bhattacharjee, Pran Krishna Thakur, Jeebit Singh, and R. S. Dhua
Post-Harvest Management of Fresh Cut Flowers347
Vigya Mishra and Shailendra K. Dwivedi
Post-Harvest Management of Medicinal and Aromatic Plants401
S. Das, S. Sultana, and A. B. Sharangi
Post-Harvest Management of Spice Crops441
S. Sultana, S. Das, and A. B. Sharangi
Biotechnological Approaches to Improve Postharvest Quality of Fruits and Vegetables491
Bishun Deo Prasad, Sangita Sahni, and Mohammed Wasim Siddiqui
Advances in Postharvest Disease Control in Vegetables505
Md. Arshad Anwer
Index543

Postharvest Biology and Technology of Horticultural Crops Principles and Practices for Quality Maintenance

The ultimate goal of crop production is to provide quality produce to consumers at reasonable prices. Most fresh produce is highly perishable, and postharvest losses are significant under the present methods of management in many countries. However, significant achievements have been made during the last few years to curtail postharvest losses in fresh produce and to ensure food security and safety as well. These include advancements in breeding horticultural crops for quality improvement; postharvest physiology; postharvest pathology and entomology; postharvest management of fruits, vegetables, and flowers; nondestructive technologies to assess produce quality; minimal processing of fruits and vegetables; as well as innovations in packaging and storage technology of fresh produce.

Postharvest Biology and Technology of Horticultural Crops: Principles and Practices for Quality Maintenance presents these advancements in postharvest quality improvement of fresh horticultural produce. It presents important new advances that will extend the shelf life of fresh produce by retaining its safety and nutritional or sensory quality. This book will be a standard reference work for postharvest management for the fresh produce industry.

"A welcome addition to the field of postharvest food preservation. It provides students and researchers with a comprehensive and authoritative understanding of the science and technology underpinning the postharvest preservation of horticultural crops. I highly recommend it to anyone concerned with reducing postharvest losses of food."

—Charles L. Wilson, Founder/Chairman & CEO, World Food Preservation Center LLC

ABOUT THE EDITOR

Mohammed Wasim Siddiqui, PhD, is an Assistant Professor and Scientist in the Department of Food Science and Post-Harvest Technology at Bihar Agricultural University in Sabour, India, and is the author or co-author of 30 peer-reviewed journal articles, 18 book chapters, and 18 conference papers. He has also three edited and one authored books to his credit. Dr. Siddiqui has established an international peer-reviewed journal, *Journal of Postharvest Technology*. He was recently appointed Editor-in-Chief of the book series Postharvest Biology and Technology, published by Apple Academic Press, and is also Acquisitions Editor for Horticultural Science for AAP. He has received several grants from various funding agencies to carry out his research work during his academic career and continues to make important contributions to the field of postharvest crops.



