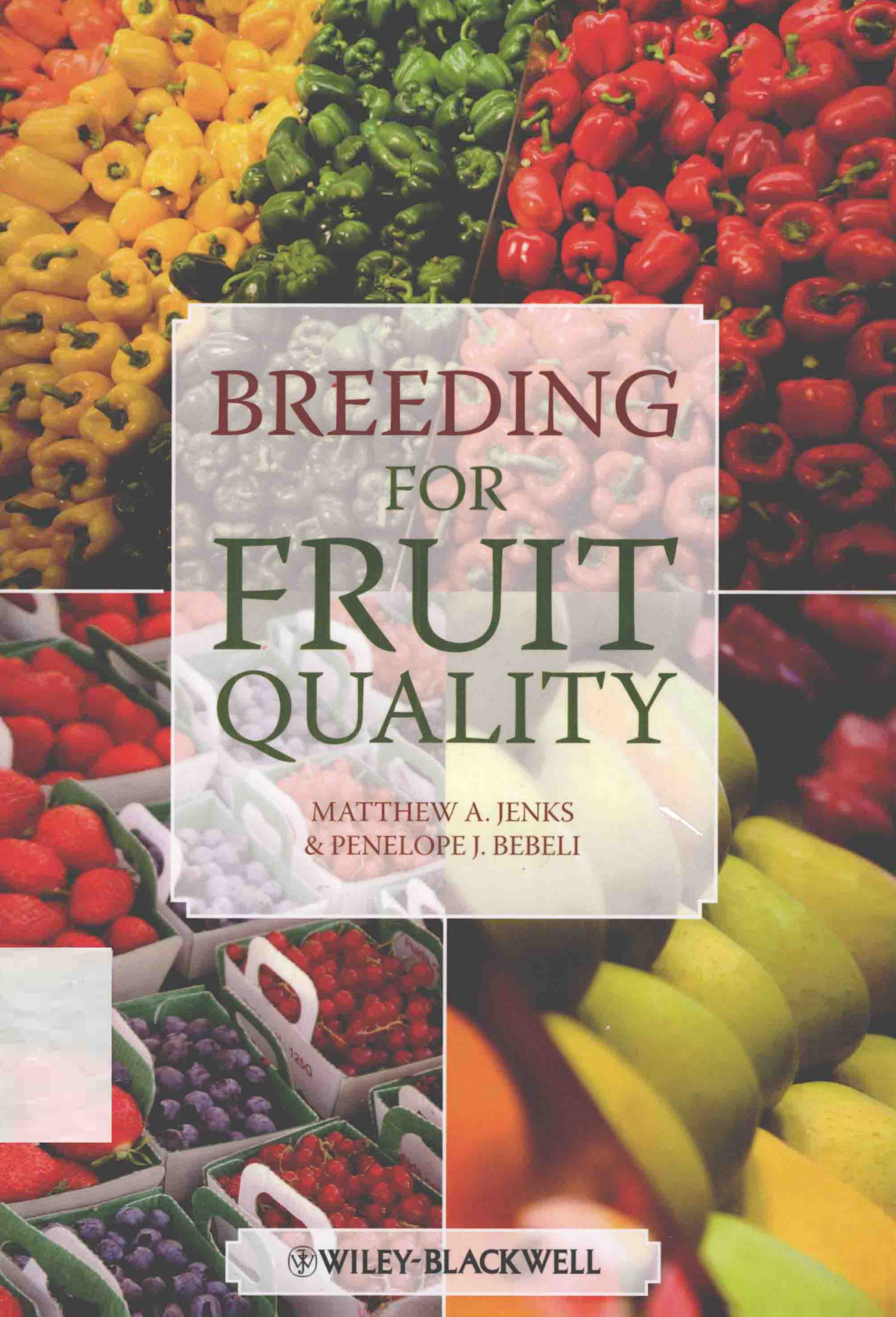

BREEDING FOR FRUIT QUALITY

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& PENELOPE J. BEBELI

WILEY-BLACKWELL

Breeding for Fruit Quality

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WILEY-BLACKWELL

A John Wiley & Sons, Ltd., Publication

Wiley-Blackwell is an imprint of John Wiley & Sons, formed by the merger of Wiley's global Scientific, Technical and Medical business with Blackwell Publishing.

Registered Office
John Wiley & Sons Ltd, The Atrium, Southern Gate, Chichester, West Sussex, PO19 8SQ, UK

Editorial Offices
2121 State Avenue, Ames, Iowa 50014-8300, USA
The Atrium, Southern Gate, Chichester, West Sussex, PO19 8SQ, UK
9600 Garsington Road, Oxford, OX4 2DQ, UK

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Library of Congress Cataloging-in-Publication Data

Breeding for fruit quality / editors: Matthew A. Jenks, Penelope J. Bebeli.
p. cm.
Includes bibliographical references and index.
ISBN 978-0-8138-1072-0 (hardcover : alk. paper)
1. Fruit–Breeding. 2. Fruit–Genetic engineering. 3. Fruit–Quality. I. Jenks, Matthew A. II. Bebeli, Penelope J.
SB359.35.B74 2011
634′.042–dc22

2010040941

A catalogue record for this book is available from the British Library.

This book is published in the following electronic formats: ePDF 9780470959336; Wiley Online Library 9780470959350; ePub 9780470959343

Set in 10.5/12pt Times by SPi Publisher Services, Pondicherry, India
Printed and bound in Singapore by Fabulous Printers Pte Ltd

1 2011

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Preface

The importance of fruit quality in fresh-picked produce and the ability to maintain high quality during storage is becoming increasingly important as producers seek to reduce the cost of energy inputs while working to feed a growing world population. Fruits are defined botanically in this book as the mature or ripened ovary wall of the flower and include a collection of many important food crops, such as apples, cherries, peaches, plums, apricots, grapes, blueberries, currants, cranberries, strawberries, raspberries, olives, avocados, bananas, pineapples, oranges, lemons, limes, grapefruits, kiwifruits, pomegranates, mangos, guavas, figs, tomatoes, peppers, eggplants, cucumbers, pumpkins, watermelons, cantaloupes, squashes, and many others. Although nuts, grains, and some spices are derived from botanic fruits, only the fleshy edible fruits are considered in these chapters. The size of the fruit industry worldwide, as defined, is difficult to estimate but is well into the hundreds of billions, with tomato leading in tonnage produced (i.e., 125 million metric tons per year), followed in order by citrus, watermelon, banana, grape, and apple (FAO Statistics, 2005). Cucumbers, eggplants, cantaloupes and melons, mangos, and peppers also have prominent world market share.

Fruits are important to the human diet, contributing among other health benefits significant amounts of vitamins, minerals, antioxidants, and fiber. Fruits are important to human health because people groups from around the world that have limited access or otherwise consume less fruits are predisposed to numerous health problems including increased rates of cancer, cardiovascular diseases, and neurological and macular degeneration. Fruits, however. are high priced commodities in most parts of the world, and because of this, are scarce in diets of many having low incomes. Increasing the access to high quality fruit is thus of critical importance to sustain the health and well-being of our world's growing populations.

Recent reports suggest that contemporary production practices and crop breeding strategies to increase fruit yield have contributed little to increasing the actual nutritional value of fruits. For example, the nutrient content of many commodities has declined due to modern production systems managed to grow large fruit rapidly, in what has been called a nutrient dilution effect. In addition, many new cultivars selected for high yield, apart from selection for overall nutrient content, also exhibit significant nutrient decline. New production practices that promote earlier harvesting (before full ripening) and modern commodity distribution systems that require long distance shipping and long-term storage of fruits can also cause a decline in fruit nutrition and other important fruit quality attributes.

A renewed effort worldwide to improve fruit yield and quality is underway, as evidenced in the new specialty crop research initiatives being supported by many national and international agricultural agencies. Although great advances are expected from research to improve fruit quality through modification of both field-production and postharvest practices, the potential to apply modern

breeding approaches to improve fruit characteristics such as appearance, organoleptic properties, nutritional value, trait homogeneity, and storage life is an exciting area of research whose possible impacts on world food systems have only begun to be explored.

This book will present a thorough analysis of the plant breeding efforts ongoing worldwide to improve fruit quality, as well as a contemporary understanding of the physiological, biochemical, developmental, and genetic mechanisms underlying the associated traits. Chapters in this book will examine new strategies being employed to identify and then enhance fruit characteristics, including efforts to discover existing genetic variation in crop germplasm and wild relatives, and to manipulate genetic variation using classical, transgenic, and molecular marker-assisted breeding approaches. This book seeks to integrate discussion of these modern crop improvement strategies and expertise with recent advances in our understanding of the key biological determinants of fruit quality. Information presented here will be especially useful to agronomists and horticulturists, crop breeders, molecular-geneticists, and biotechnologists and serve as an important scholarly text for educators, postgraduate students, and researchers.

We, the editors, would like to give a special thanks to the authors for their outstanding and timely work in producing such excellent chapters. We would also like to thank Wiley-Blackwell Publishing's Justin Jeffryes for his advice and encouragement during the development process. And finally, we thank the Fulbright Foundation – Greece for bringing the two editors together in Athens to plan and produce this important book, "Breeding for Fruit Quality".

Matthew A. Jenks and Penelope J. Bebeli

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