

Book Review:**Pomegranate Production and Marketing**

Ibrahim Kahramanoglu and Serhat Usanmaz. CRC Press, Taylor and Francis Group, 6000 Broken Sound Parkway NW, Suite 300, Boca Raton, FL33487-2742. Hardcover. ISBN 13:978-1-4987-6850-4. \$149.95.

This book is relatively short, with 134 pages, 15 chapters, 52 figures, and 20 tables. It ranges from cultivar descriptions, production, biotic and abiotic challenges to production, to postharvest, aril and juice production, health benefits, and international trade. It contains great information and can be a rich reference for information on pomegranates. However, the book appears not to have been carefully edited for scientific content and English, making parts confusing and somewhat difficult to read. Therefore, in several places, nouns and verbs do not agree, there are misspellings, such as: “seeds are oil reach” rather than the correct “seeds are oil rich.” The pointed branches on pomegranates are modified stems, and therefore are thorns, whereas in the book, they are called “spines,” which are modified leaves, such as seen on cacti. Some parts of the book are uneven, such as taste only being mentioned for some of the cultivar descriptions. The authors are from Cyprus, and cultivars, pests, and many descriptions are focused on this general area of Europe. For example, the leaf-footed bug is an important pomegranate pest in California, but is not mentioned in the book.

Even with these shortcomings, this is a valuable book on pomegranates. The authors have much practical experience with growing, harvesting, postharvest, and marketing this crop. Chapters in which the authors drew on their own practical experiences have few references; these include Important Cultivars, Ecological Needs (a two-paragraph chapter), Production, Pomegranate Pests,

Pomegranate Diseases, Weed Management, Physiological Disorders, Fruit Thinning, and Harvest and Fresh Fruit Processing. The other six chapters are written more as literature reviews, and include the Introduction, Postharvest Biology and Storage, Aril Production, Juice Production, Pomegranate and Health (Review), and Pomegranate Trade.

Both the chapters written based on the authors’ experiences and the literature review chapters are valuable as reference materials. There are many useful tables in this book that are original and have practical importance. For example, there is a table on the daily irrigation water requirements of pomegranates for the eight-month growing season for plants of various age categories. There is a table on the nitrogen-phosphorus-potassium requirements of pomegranates of various ages. The authors even provide the optimum leaf mineral concentrations for pomegranate. For chemical control of pests, diseases, and weeds on pomegranates, tables are provided with recommended concentration, harvest interval, and the EU maximum residue level (MRL) of each chemical.

The Introduction does a good job setting up the book and explaining that the history of pomegranate cultivation dates back to 3000 BCE, thus documenting 5000 years of production. Facts – such as pomegranates being berries; explaining that the three types of flowers, hermaphrodite, male, and intermediate forms, mainly occur on spurs; normal fruit size range (200-1000 g) and extremes, up to 1800 g/fruit; and the story about there being 613 pomegranate seeds in one pomegranate fruit (the range is 200-800), making one for every commandment in the Jewish Bible – are all very interesting and enrich the book.

Especially in chapters drawn from the authors’ experiences, the information present-

ed is very practical and should be valuable to both new and experienced pomegranate growers. For example, good detail is presented on when and how to thin pomegranate fruit, including a before-and-after thinning photograph. The explanation of how and when to harvest pomegranate fruit is equally practical and useful. For example, the authors recommend that any dew be completely dry before harvest to avoid blemishes, that shears be used for harvest and they show a photograph of the stem end of properly harvested fruit. They correctly emphasize that as soon as the pomegranate fruit is harvested, weight reduction begins as moisture is lost, and why coolness is important to begin the postharvest life of pomegranates.

Because the USDA does not have any quality standards for pomegranates, the authors explain the EU standards based on the Codex standards for classification of pomegranates. They explain the differences between "Extra," "Class I," and "Class II and also present a table on packing sizes for pomegranate fruit.

The authors do a good job explaining quality attributes for pomegranates, externally and internally. Color, size and shape are components of external quality, whereas, texture, soluble solids, titratable acidity, anthocyanins, phenolics, ascorbic acid, volatiles, and nutritional quality are components of internal fruit quality. These are each explained and a table is presented on the nutrient components of 'Wonderful' arils and juice.

Postharvest deterioration of pomegranates is explained and storage recommendations are given to reduce this deterioration. One example is modified atmosphere storage, which is explained along with modified

atmosphere packaging, which increases aril shelf life to about 14 days.

Challenges with efficient aril removal are explained. Tools and a machine for removing arils are described; however, hand extraction is the traditional method. The challenges and inefficiencies of removing arils have contributed to the popularity of juice, which is much easier to extract from the fruit. Juice production and handling are described in some detail.

An interesting review chapter is on pomegranates and health. The review is well done and literature from quality scientific journals is cited. From reading this chapter, it appears that pomegranates are a fountain of youth and are a major health benefit. Consumption of pomegranates and their products helps with cardiovascular health, hyperlipidemia, and hypertension. Pomegranates have antioxidant properties, anti-carcinogenic benefits, anti-microbial properties, anti-inflammatory activity, anti-diabetic properties, and antiviral properties. Pomegranates also help with oral and skin health, obesity, erectile dysfunction, sperm quality, and Alzheimer's disease.

I recommend this book as a reference for pomegranate growers and researchers. Although there are some confusing sentences because of the apparent lack of editing, there is much practical information packed into this small book. It is a service to have this information together in one reference.

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