Preface

The importance of research into plant senescence cannot be overemphasized. Senescence processes are unique developmental programs that involve unique mechanisms. For example, unlike many other developmental processes in plants that involve cell division, cell differentiation, and/or cell growth (enlargement), leaf senescence is achieved by a massive operation of programmed cell death and nutrient recycling. It is known that new gene expression is required in order for leaf cells to destroy themselves and to recycle nutrients. The cell has to maintain its machinery necessary for new gene expression and nutrient transport while its subcellular structure and macromolecules are being dismantled by some of the new gene products. How gene expression is regulated and how this complex process operates are currently among the most significant biological questions.

Senescence has a tremendous impact on agriculture. Leaves are the primary organs that absorb light energy from the sun and convert it to chemical energy in the form of sugars via photosynthesis. With the onset of senescence, the photosynthetic capability of a leaf declines sharply. Therefore, leaf senescence limits crop yield and biomass production, and contributes substantially to postharvest loss in vegetable and ornamental crops during transportation, storage and on shelves. In addition, proteins, antioxidants and other nutritional compounds are degraded during senescence. Senescing tissues also become more susceptible to pathogen infection, and some of the pathogens may produce toxins, rendering food unsafe. Mitotic senescence may also determine sizes of leaves, fruits and whole plants.

This scientific and economic significance means that much effort has been made to understand the senescence processes in plants and to devise means of manipulating them agriculturally. During the past few years there has been significant progress in this regard, especially in the molecular, genetic and genomic aspects.

This volume summarizes recent progress in the physiology, biochemistry, cell biology, molecular biology, genomics, proteomics, and biotechnology of plant senescence. The term *senescence* has been used by both plant and animal biologists, but it may describe completely different processes. Beginning with senescence-related terminology and our current knowledge of mitotic senescence in plants (a less well-studied area, Chapter 1), the book focuses on post-mitotic senescence, including senescence of leaves (Chapters 2 through 10), flowers (Chapter 11), and fruits (Chapter 12). This research has led to the development of various new biotechnologies for manipulating the senescence processes of fruit (Chapter 12) and leaves (Chapter 13), some of which are approaching commercialization.

Senescence Processes in Plants will be a very useful reference book for senescence researchers based in academia and industry. It may also serve as a textbook for advanced undergraduate students and graduate students.

I would like to thank all the authors for their excellently written chapters and the publishers for their enthusiasm.

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