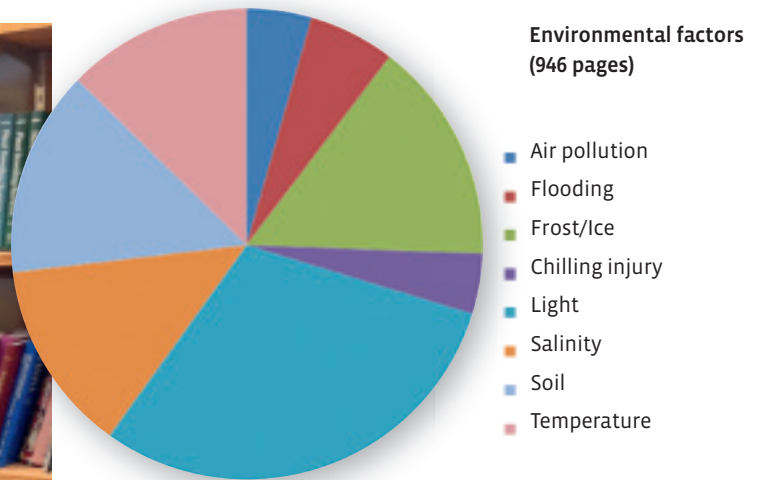




History

> A lasting legacy – Horticultural Reviews and Plant Breeding Reviews

Ian Warrington and Irwin Goldman



■ Figure 1. The impacts of environmental factors on the growth and development of many horticultural crops have been extensively covered in a number of reviews in *Horticultural Reviews*.

> Jules Janick standing in front of an impressive lineup of *Horticultural Reviews* and *Plant Breeding Reviews* on his bookcase.

pests (213 pages), fungi (246 pages) and viruses (200 pages), with less coverage afforded to bacteria and nematodes. The impacts of different mineral elements on various horticultural crops have also received attention with particular coverage of the importance of nitrogen (176 pages) and calcium (166 pages). Given the critical importance of many environmental factors on plant growth, flowering, fruiting and fruit/vegetable/flower quality, it is not surprising that there has been inclusion of a significant number of reviews covering the impacts of light, temperature, salinity, and freeze injury (Figure 1) as well as carbon dioxide and water (Table 2) on plant growth and development.

Horticulture embraces many different areas of plant science and botany, and reviews have been included on many different disciplines within plant physiology, such as flowering, carbohydrate metabolism, photosynthesis and ethylene biosynthesis (Table 3), along with many areas of botany, such as taxonomy, systematics, morphology and classification. Specific attention has been given to the roles of plant growth regulators, especially auxins, gibberellins and ethylene on crop growth and development. These reviews have been prepared by over 700 contributors from many parts of the world.

Plant Breeding Reviews

There have now been 40 volumes of *Plant Breeding Reviews* published over the past 33 years, comprising 316 review articles and

Horticultural Reviews and the partnership publication, *Plant Breeding Reviews*, are widely recognised as being premier publications in horticultural science literature globally. Both were established under the initiative of Prof. Jules Janick – *Horticultural Reviews* in 1979 and *Plant Breeding Reviews* in 1983 – having identified a niche for such publications amongst a wealth of other scientific journals at that time, none of which specialised in review articles of significant length and depth in the various fields of horticultural science.

Horticultural Reviews

There have now been 44 volumes of *Horticultural Reviews* published over the past 37

years, comprising 347 review articles and 18,936 pages in aggregate. Many of the major fruit, berry, nut, vegetable and ornamental species have been covered in significant review articles (Table 1). A number of other species have been included as an integral part of other reviews. The species coverage includes those grown in temperate, sub-tropical and tropical regions of the world. Within and across many of these crops, *Horticultural Reviews* covers many different aspects of crop management, including both pre- and postharvest, and field and protected cultivation (Table 2). Reviews on disease and pest management have also been included (over 700 pages of content), with almost equal coverage of insect and mite

■ Table 1. Main horticultural crops included in reviews in *Horticultural Reviews*.

Temperate fruit		
Almond	Fig	Nectarine
Apple	Grape	Olive
Apricot	Kiwifruit	Peach
Avocado	Loquat	Pear
Cherry	Melon	Pomegranate
Citrus	Navel orange	
Others: feijoa, lemon, mandarin, orange, passion fruit, pawpaw, persimmon		
Berryfruit		
Blackberry	Currants	Red bayberry
Blueberry	Elderberry	Strawberry
Bramble	Lingonberry	
Cranberry	Raspberry	
Others: barberry, bilberry, black currant, gooseberry, mulberry		
Nuts		
Chestnut	Macadamia	Pecan
Others: filbert (hazelnut), walnut		
Tropical fruit		
Banana	Caper bush	Jujube
Ber	Date palm	Lychee
Cactus	Jojoba	Mango
Others: cacao, cherimoya, coconut palm, coffee, custard apple, durian, longan, mangosteen, papaya		
Vegetables		
<i>Allium</i>	Cowpea	Pumpkin
Aroids	Eggplant	Sorghum
Asparagus	Garlic	Squash
Aubergine	Horseradish	Sweet potato
Bean	Lettuce	Tomato
Bitter melon	Mung bean	Watermelon
Capsicum pepper	Pepper (<i>Piper</i>)	
Cassava	Potato	
Others: adzuki bean, beet, broccoli, Brussels sprouts, cabbage, carrot, cauliflower, celeriac, celery, chicory, cucumber, <i>Dioscorea</i> (yam), leek, okra, onion, parsley, parsnip, taro		
Ornamentals		
<i>Amaryllidaceae</i>	Cut flowers	<i>Leucadendron</i>
Aroids	Daylily	<i>Leucospermum</i>
<i>Artemisia</i>	<i>Dieffenbachia</i>	Orchid
<i>Banksia</i>	Dogrose	Protea
Carnation	Foliage plants	Rose
<i>Chrysanthemum</i>	Heliconia	Tulip
Others: <i>Agapanthus</i> , anthurium, azalea, bedding plants, begonia, belladonna, <i>Caladium</i> , <i>Clivia</i> , <i>Colocasia</i> , cotoneaster, <i>Cyrtanthus</i> , Easter lily, geranium, <i>Hippeastrum</i> , <i>Lycoris</i> , <i>Narcissus</i> , <i>Nerine</i> , <i>Scadoxus</i>		
Other (mushrooms, spices, herbs, tree species)		
<i>Agaricus</i>	Ginseng	Palms
Black pepper	Gourds	<i>Salix</i>
Chayote	Mushrooms	Stone pine
Datura	Nightshades	Tea
Ginger	Opium poppy	
Others: <i>Alocasia</i> , hawthorne, henbane, myrrh, oil palm		

■ Table 2. Main horticultural management practices included in reviews in *Horticultural Reviews*.

Irrigation	Anti-transpirants Deficit irrigation Drip irrigation Roots
Fruit and vegetable management	Fruit thinning Grafting Girdling Harvesting Pest management Pruning Rootstocks Replant management Yield determinants
Plant propagation	Asexual embryogenesis Cryopreservation In vitro/tissue culture Seeds and seed germination
Greenhouses	CO ₂ enrichment Crop management Design Energy use efficiency Nutrient film technique Pest management
Postharvest technologies	MA and CA storage Packaging Quality evaluation

■ Table 3. Physiological processes covered in reviews in *Horticultural Reviews*.

Flowering and fruiting	Abscission Alternate bearing Juvenility Parthenocarp Pollination Photoperiod Vernalisation
Plant processes	Anthocyanin synthesis Carbohydrate metabolism Cell walls and membranes Circadian rhythms Cold hardiness Dormancy Gravitropism Metabolism Photosynthesis Respiration Volatile synthesis
Postharvest	Disorders Senescence

15,392 pages in aggregate. Each volume has included an average of nearly eight reviews, with several volumes devoted to specific topics such as long term selection (Vol. 24), raspberry breeding (Vol. 32), and the U.S. National Plant Germplasm System (Vol. 7). One of the most impressive features of this collection of review articles is that they were authored by more than 700 scientists from around the world, comprising what is certainly the largest collection of review articles and perspectives from plant breeders over a 33 year period.

Plant Breeding Reviews includes up-to-date reviews on plant breeding and genetics of all types of crops by both traditional and molecular methods. These reviews help breeders, scientists, policy makers, students, and others understand the genetic basis of key world crops and help in the preservation of crop genetic resources. In addition, the reviews provide detailed analysis of key concepts and approaches in plant breeding, serving as a repository for the latest thinking on scientific methods in the field. The emphasis of the series is on methodology, a

fundamental understanding of crop genetics, and specific applications to major crops. Recent reviews have covered state-of-the-art topics such as association mapping in plant breeding, epigenetics and its influence on genotype and environment, development of synthetic hexaploids in wheat, nutritional enhancement of staple food crops, prospects of transgenic vegetables, doubled haploid breeding, and use of interspecific periclinal chimeras in cultivar development. Dozens of critical reviews of breeding approaches for many of the world's most important economic crops appear in the pages of *Plant Breeding Reviews*, providing what is probably the single largest source of such information in any publication (Table 4). *Plant Breeding Reviews* also includes the most complete and comprehensive discussions of key plant breeding topics, such as heritability and estimation of genetic variances, which far exceed what one would be able to assemble from plant breeding textbooks or journal articles. On certain topics, *Plant Breeding Reviews* contains a series of chapters that, taken together, form an incredibly important and unique body of work. For example, on the subject of maize breeding, *Plant Breeding Reviews* contains detailed information on anther culture, apomixis, biotic resistance, doubled haploid breeding, utilization of exotic germplasm, selection for reduced foliar diseases, selection for oil and protein concentration, honeycomb breeding designs, hybrid breeding, breeding for insect resistance, long term selection, male sterility, marker-assisted selection, overdominance, quantity and quality of storage proteins, recurrent selection, tolerance to acid soils,

■ Table 4. Main economic crops included in *Plant Breeding Reviews*.

Fruit, nut and berry crops	Vegetable crops	Agronomic, forest, tree and shrub crops	
Almond	Amaranth	Alfalfa	Rubber
Apple	Bean	Barley	Sesame
Banana	Table beet	Cassava	Soybean
Blackberry	Carrot	Coffee	Spelt
Black walnut	Chili pepper	Cotton	Sugarcane
Blueberry	Cucumber	Cowpea	Triticale
Cactus	Eggplant	Douglas fir	Wheat
Chestnut	Garlic	Durum wheat	White clover
Currant	Lettuce	Fescue	Wild rice
Gooseberry	Melon	Guayule	
Grapefruit	Mushroom	Maize	
Loquat	Snap pea	Oat	
Papaya	Potato	Oil palm	
Plantain	Rutabaga	Peanut	Flower crops
Raspberry	Sweet corn	Pearl millet	Chrysanthemum
Strawberry	Sweet potato	Perennial ryegrass	Rose
Sweet cherry	Tomato	Rice	

■ Table 5. Many notable international horticultural scientists and plant breeders have been included in dedications written by their peers in either *Horticultural Reviews* or in *Plant Breeding Reviews* over the past 38 years.

Dedications in <i>Horticultural Reviews</i>			Dedications in <i>Plant Breeding Reviews</i>
Bailey, Liberty Hyde	Hess, Charles E.	Ryugo, Kay	Bliss, Frederick A.
Beach, Spencer A.	Hummer, Kim E.	Sansavini, Silviero	Bringham, Royce S.
Bukovac, Martin J.	Kader, Adel A.	Sedgely, Margaret	Brewbaker, James L.
Campbell, Carl W.	Kamemoto, Haruyuki	Sherman, Wayne B.	Coyne, Dermot E.
Cantliffe, Daniel J.	Kester, Dale E.	Simon, Philipp W.	Daubeny, Hugh A.
Clark, John R.	Looney, Norman E.	Smock, Robert M.	Gabelman, Warren H.
Cummins, James N.	Magness, John R.	Sperling, Calvin R.	Jahn, Margaret, M.
De Hertogh, August A.	Maynard, Donald N.	Spiegel-Roy, Pinhas	Jennings, Derek
Dennis, Frank G. Jr	Mitchell, Cary A.	Stevens, M. Allen	Munger, Henry M.
Faust, Miklos	Mizrahi, Yosef	Thompson, Maxine M.	Peloquin, Stanley J.
Finn, Chad E.	Moore, James N.	Warrington, Ian J.	Ryder, Edward J.
Ferguson, A. Ross	Possingham, John V.	Weiser, Conrad J.	Vuylsteke, Dirk R.
Goldman, Irwin L.	Pratt, Charlotte, S.	Whitaker, Thomas W.	Weinberger, John H.
Hackett, Wesley P.	Proebsting, Edward L. Jr.	Wittwer, Sylvan H.	Zohary, Daniel
Halevy, Abraham H.	Rick, Charles M. Jr.	Yang, Shang Fa	

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boards who help identify topics that are worthy of review and potential contributors for such subjects, as well as assist with refereeing responsibilities.

Concluding comments

Both *Horticultural Reviews* and *Plant Breeding Reviews* have become essential reading for horticultural scientists, botanists, agronomists and plant scientists in general. These two review journals have provided timely reviews on many different areas that are highly topical to horticultural science in particular and to many other areas of plant science as well. The coverage of topics has been extensive and reflects the interests and specialities of Prof. Janick who, throughout his career has shown an acute interest and application to many different areas of plant science that are relevant to horticulture, including plant breeding.

Future volumes will no doubt contain updates to reviews that were published 30 to 40 years ago. Advances have been made in our understanding of the various plant sciences associated with horticultural science, and new technologies have evolved. The emergence of new areas such as robotics, controlled environment farming and of the various “omics” (genomics, proteomics, etc.) will, no doubt, also be the subject of future reviews.

Prof. Janick retired as editor of both publications in 2016. He leaves a lasting legacy that will endure for years to come. ●

› An invitation

The publication of an authoritative review in a specialised area of scientific endeavour is often the highlight of a professional career. You, together with your colleagues and students, are invited to submit a review to either of these publications. Reviews should be between 30 and 100 double-spaced pages (which translate into 15-50 printed pages). Manuscripts can be submitted at any time. Guidelines will be provided on request. Enquiries and submissions should be made as follows:

Horticultural Reviews
To Prof. Ian Warrington
at ianjw@xtra.co.nz

Plant Breeding Reviews
To Prof. Irwin Goldman
at ilgoldma@wisc.edu

transposable elements, unreduced gametes, and selection for yield. One can also use *Plant Breeding Reviews* to examine how selection for resistance to a particular pest, such as nematodes, is approached from a range of different crop species, including separate reviews on apple rootstocks, banana, plantain, coffee, cowpea, raspberry, soybean, and sweet potato.

Special features

A special element of both *Horticultural Reviews* and *Plant Breeding Reviews* has been the dedicatory chapters included within many of the volumes, which are comprised of descriptive biographies of key individuals involved in horticultural science, plant breeding and genetics. These included seminal figures associated with plant breeding such as Norman E. Borlaug (Vol. 28), Glenn Burton (Vol. 3), Donald Duvick (Vol.

14), Jack Harlan (Vol. 8), Henry Jones (Vol. 1), Ernest Sears (Vol. 10), and George Sprague (Vol. 2). A complete list of dedicatory honourees relevant to the breeding of horticultural crops is shown in Table 5.

Similarly, 45 internationally renowned horticultural scientists, past or present, have been recognised with dedicatory chapters in *Horticultural Reviews*, covering North America, Europe, Asia and Australasia (Table 5).

Both of these *Reviews* include extensive cumulative indexes which make it easy to search for specific topics. In *Horticultural Reviews* there are 33 double column pages dedicated to the index while in *Plant Breeding Reviews* there are more than 42 single spaced pages with thousands of entries on every conceivable plant breeding topic.

The editors of these two publications are each supported by small editorial advisory