

# Chapter 37

## Scholarship and Literature in Horticulture

Ian J. Warrington and Jules Janick

**Abstract** Horticulture and its related sciences have produced a rich diversity of literature ranging from highly specialised scientific journals and scholarly books to detailed manuals for producers, from technical and popular books on gardening and cooking to encyclopaedias on highly specialised topics, and from newspaper and magazine articles to entries on the World Wide Web. These publications span a period of over 200 years. Included are food crops such as fruit, nuts, vegetables, and condiments; ornamentals and landscaping plants including trees, shrubs, and cut flower and bedding crops; turf grasses; medicinal plants and the use of plants for human wellbeing and therapy. This chapter presents selected examples of how horticulture has contributed to scholarship and literature. It also includes examples of how horticulture has been recorded in classical literature and become an integral part of many every-day sayings.

**Keywords** Scholarship · Literature · Art · Teaching · Science · Technology · Poetry · Aphorisms

### Introduction

Scholarship associated with horticulture is multifaceted. The literature relating to the science and technology of horticulture is diverse and prolific, and goes back to antiquity. Horticultural information forms a vital part of human knowledge. It ranges from highly specialised scientific journals and treatises to detailed manuals for producers, from technical and popular books on gardening and cooking to

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encyclopaedias on highly specialised topics, and from newspaper and magazine articles to entries on the World Wide Web. All fill a niche in covering those topics that define horticulture. Included are food crops such as fruit, nuts, vegetables, and condiments; ornamentals and landscaping plants including trees, shrubs and cut flower and bedding crops; turf grasses; medicinal plants and the use of plants for human wellbeing and therapy. Incorporated in this literature are all of the elements of science and the details of techniques and technologies that are associated with horticulture: plant breeding and cultivar selection, seed technology, pruning and training, harvesting, quality assurance, disease and pest control, irrigation, fertilisation, and postharvest management. Horticultural science contributes directly and very significantly to primary knowledge about all phases of plant growth and development. The role of the horticulturist is to apply that knowledge for the betterment of humankind through achieving sustainable and efficient production of food and ornamental crops, and to enhance human wellbeing in a myriad of different ways.

Horticulture is part of the literary tradition. Many of the beloved plants of horticulture—particularly tree and herbaceous fruits, and various ornamentals and especially flowers—are embedded in the writings of all cultures, including various holy books such as the Hebrew bible, New Testament, Qur'an, and sacred texts of Hinduism and Buddhism. There are frequent allusions to horticultural plants by many famous writers in the West from Shakespeare to James Joyce and in the East from scholars in countries such as China and Japan. Horticulture references in prose and poetry are a distinct part of our humanitarian heritage (Palter 2002). The object of this chapter is to provide a very brief overview of the enormous subject of scholarship and literature in horticulture. The related topic of art and horticulture is covered in a separate chapter of this volume.

## Scientific Journals

The outputs of what can be deemed to be “modern” horticultural science have been published for more than 200 years in many different and diverse scientific journals, books, industry magazines and the popular press. Many of the current scientific journals that are used to publish results from horticultural research have their origins in the horticultural science societies that were formed in many countries in the nineteenth century following the modernisation of agriculture. A further phase occurred in the twentieth century with the emergence of scientific research as a critical and respected activity within modern society. These journals are typically hosted by scientific societies who organise the editorial policies, peer review processes and publishing, distribution, and marketing. The majority of these publications cover most aspects of horticultural science including all horticultural crops (fruit, vegetables, cut flowers, ornamental and landscape plants, viticulture, turfgrasses, mushrooms, medicinal plants, and others) and all of the technologies associated with horticultural research (Table 37.1).

**Table 37.1** Disciplines associated with horticultural science

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Plant sciences: botany, ecology, genetics, plant physiology, plant molecular biology, plant breeding, soil science, taxonomy
Production technologies: irrigation, growing media, hydroponics, plant nutrition, pruning and training
Computing and engineering: greenhouse design, grading and handling, mechanization, precision agriculture, storage
Plant protection: entomology, plant pathology, weed science
Enterprise management: enterprise structure and operations, sales and marketing, supply chain components and practices
Behavioral sciences: communication and information transfer, sensory evaluation, market research

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Horticultural science societies have retained the control and management of scientific journals in spite of the activities of major publishing houses in this business. These societies regard such publishing as providing a critical service to their members, a means of keeping publishing costs down through the voluntary efforts of members in editorial, reviewing, and publishing activities, and a means of showing independence in the control of the dissemination of scientific findings.

Notwithstanding this independent role of the horticultural science societies, these same societies have had to make a number of changes, particularly over the past two decades, to remain relevant and competitive. This has included relatively simple changes such as the inclusion of coloured photographs, the adoption of new formats, and an increase in page number and size. The most significant change, however, has been the shift to include on-line availability of each issue of the journal, often before the physical version is printed and distributed. Many societies ensure that archived issues are available to download for a nominal fee or free of charge to members (see [www.Pubhort.org](http://www.Pubhort.org) and [www.ashs.org](http://www.ashs.org)). A sample of the journals that specialise in horticultural science is shown in Table 37.2.

As horticultural science is not a single discipline but is comprised of a great number of related and inter-dependent disciplines, it is not surprising that the outputs of horticultural science are not only published in journals that specialise in horticultural science but in many other scientific journals that focus on related disciplines. A small sample of such journals is summarised in Table 37.3. These journals too are either managed by specialised professional societies or, more typically, by large, multi-national publishing companies.

A major development of the past two decades has been the emergence of impact and related factors for scientific journals and of citation ratings for individual articles. These measures have been developed by organisations such as the ISI Web of Knowledge, provided by the private company Thompson Reuters. The merits or otherwise of these metrics (Janick 2008) have been extensively explored across many disciplines but the measures are now well established and are used to assess the relative rankings of journals, the importance of specific scientific papers, and even the weighting that should be given to an individual scientist's publications when submitted in support of applications for academic promotion. The basis of the metrics underpinning measures such as impact factors rely heavily on publica-

**Table 37.2** Selected international journals specialising in horticultural science

Journal title	Country of origin	Year established	Publisher
Acta Horticulturae	Belgium	1963	International Society for Horticultural Science
Acta Horticulturae Sinica	China	1962	Chinese Society for Horticultural Science
American Journal of Enology and Viticulture	USA	1950	American Society for Enology and Viticulture
American Journal of Potato Research	USA	1923	Springer
European Journal of Horticultural Science	Germany	1929; Formerly Gartenbau-wissenschaft	Verlag Eugen Ulmer Stuttgart (German Society for Horticultural Science)
Fruits	France	1945; Formerly Fruits d'Outre Mer	EDP Sciences
HortScience	USA	1968	American Society for Horticultural Science
HortTechnology	USA	1991	American Society for Horticultural Science
Horticulture Reviews	USA	1979	Wiley
Indian Journal of Horticulture	India	1942	Horticulture Society of India
International Journal of Fruit Science	USA	2006; Formerly Small Fruits Review (2000–2005) and Journal of Small Fruit and Viticulture (1992–2000)	Taylor and Francis
Journal of the American Pomological Society	USA	1946; Formerly Fruit Varieties and Horticultural Digest (1946–1972) and Fruit Varieties Journal (1973–1999)	American Pomological Society
Journal of the American Society for Horticultural Science	USA	1903; Formerly Proceedings of the American Society for Horticultural Science (1903–1968)	American Society for Horticultural Science
Journal of Horticultural Science and Biotechnology	United Kingdom	1919	JHSB Trust
Journal of the Japanese Society for Horticultural Science	Japan	1925	Japanese Society for Horticultural Science
Korean Journal of Horticultural Science and Technology	Republic of Korea	1998	Korean Society for Horticultural Science

Table 37.2 (continued)

Journal title	Country of origin	Year established	Publisher
New Zealand Journal of Crop and Horticultural Science	New Zealand	1900: Formerly known as the New Zealand Journal of Experimental Agriculture (1900–1988)	The Royal Society of New Zealand (Taylor and Francis)
Postharvest Biology and Technology	The Netherlands	1991	Elsevier
Potato Research (Journal of the European Association for Potato Research)	Europe	1958	Springer
Rivista di Frutticoltura e di ortofloricoltura	Italy	1937	Edagricole
Scientia Horticulturae	The Netherlands	1973	Elsevier

**Table 37.3** Selected international journals with significant content relating to horticultural science

Journal title	Country of origin	Year established	Publisher
Annals of the Entomological Society of America	USA	1908	Entomological Society of America
Annals of Botany	UK	1887	Oxford University Press
Canadian Journal of Plant Science	Canada	1920	Agricultural Institute of Canada
Communications in Soil Science and Plant Analysis	USA	1970	Taylor and Francis
Critical Reviews in Plant Sciences	USA	1983–84	Taylor and Francis
Economic Botany	Germany	1947	SpringerLink
Journal of Economic Entomology	USA	1908	Entomological Society of America
Journal of Natural Products	USA		American Society Pharmacognosy; American Chemical Society
Journal of Plant Nutrition	USA	1979	Taylor and Francis
Journal of the Science of Food and Agriculture	USA	1950	Wiley-Blackwell
Physiologia Plantarum	USA	1948	Wiley-Blackwell
Phytopathology	USA	1911	American Phytopathology Society
Plant Physiology	USA	1926	American Society of Plant Biologists

tion volume (number of papers per journal issue, especially those that are recently published) and readership (citation) numbers. In many if not all areas of horticulture, these measures have to be interpreted very carefully when consideration is given to the very small numbers of scientists who work internationally on topics such as blueberry production, or the postharvest storage of melons, or the breeding of tomatoes. On that basis, and given that there is a large number of journals covering the diversity that is horticulture, the rankings for horticultural science journals and for the papers that they publish are always going to be low. Furthermore the numbers of journals and journal articles that are published annually in horticulture are comparatively small within the total sciences in general or even within the plant sciences. For example, the Web of Science lists only 31 journals involved with horticultural science whereas there are 84 involved with the plant sciences (see <http://admin-apps.webofknowledge.com>). Within the horticultural science journals listed by ISI, 3156 papers were published in 2011. However, nine of 31 journals published fewer than 50 papers per annum; the highest number (421) appeared in *Scientia Horticulturae*.

## **Textbooks**

Teaching of horticultural science degree programs in universities throughout the world has brought with it the need to have specialised texts on horticulture, on horticultural science, and on many of the specific related sciences and technologies that are included in such training programmes. A sample of such textbooks (published in English) is as follows:

### ***General Horticulture and Horticultural Science***

*Horticulture*. R Gordon Halfacre and John A Barden (1979).

*Horticultural Science*. 4th edn. Jules Janick (1986).

### ***Fruit***

*Temperate-Zone Pomology. Physiology and Culture*, 3rd edn. Melvin N Westwood (1993).

*Modern Fruit Science: Orchard and Small Fruit Culture*. Norman F Childers et al.,  
G Steven Sibbett and Justin R Morris (1995).

*Introduction to Fruit Crops (Crop Science)*. Mark Rieger (2006).

### ***Viticulture***

*Biology of the Grapevine*. G Mullins, Alain Bonquet and Lorry E Williams (1992).

*Wine Science: Principles and Application*. Ronald S Jackson (2008).

### ***Vegetables***

*Vegetable Crops*. Dennis R Decoteau (2000).

### ***Postharvest Biology***

*Postharvest Biology*. Stanley J Keys and Robert E Paull (2004).

*Postharvest Biology and Technology of Fruits, Vegetables and Flowers*.

Gopinadhan Paliyath Dennis P Murr, Avtar K Handa and Susan Lurie (2008).

*Postharvest Technology of Horticultural Crops*. Adel Kader (2002).

## ***Floriculture***

*Introduction to Floriculture*, 2nd edn. Roy A Larson (1992).

*Floriculture: Principles and Species*, 2nd ed. John M Dole and Harold F Wilkins (2004).

## ***Greenhouses Greenhouse Operation and Management***

*Greenhouse Operation and Management*, 7th edn. Paul V Nelson (2011).

*The Commercial Greenhouse*, 3rd edn. James Boodley and Steven E Newman (2008).

## ***Plant Propagation***

*Hartmann & Kester's Plant Propagation: Principles and Practices*, 8th edn.

Hudson T Hartmann, Dale E. Kester, Fred T Davies and Robert Geneve (2010).

## ***Turfgrass Management***

*Turfgrass Management*, 9th edn. A.J. Turgeon (2011).

*Turfgrass Management*, 4th. edn. R. Emmons (2007).

## ***Parks Management***

*Designs for Parks and Recreation Spaces*. TD Walker (1987).

*Arboriculture: Integrated Management of Landscape Trees, Shrubs and Vines*, 4th edn.

RW Harris, JR Clark and NP Matheny (2003).

## ***Landscape Design***

*The Essential Garden Design Workbook*. R Alexander (2009).

*Garden Design Workbook*. J Brookes (2001).

*Introduction to Landscape Design*. JL Motloch (2000).

*Landscape Design: A Cultural and Architectural History*. Elizabeth Barlow Rogers (2001).

*RHS Encyclopedia of Garden Design*, Chris Young (2009).

Many of the texts that are outlined above are used in different countries around the world to teach the specialised elements of horticulture and horticultural science, including those where English is not the first language. However, in addition to the above, a number of texts on elements of horticulture are published in a range of languages including, for example, Italian (see Baldini 1996; Fabbri 2001; Sansavini et al. 2012; Marengi 2005; Vezzosi 1998), German (Link 2002, 2011; Bettin 2011; Wonneberger et al. 2004; Friedrich and Fischer 2000; Keppel 1998;

Crüger et al. 2002; Wohanka 2006), Korean (Lee and Lee 2011; Lee et al. 2007) and Japanese (Mizutani 2002; Abe et al. 1979; Suzuki et al. 1993). Recently, Indian publishers have been releasing a large number of texts relating to horticulture (e.g., Chundawat and Sen 2002).

## Books, Monographs, Encyclopedias

Amongst the earliest recorded publications relating to horticulture are those by Theophrastus (372–288 BCE.), a Greek philosopher who has been termed the “father of botany” (Mitchell 2011). Theophrastus published a number of texts of which very few survive, but those that do include: *History of Plants* (Grk: *Ἱστορία των φυτών*, Ltn: *Historia de Plantis*) and *Causes of Plants* (Grk: *Τα αίτια των φυτών*, Ltn: *De causis plantarum*) which were the greatest and amongst the earliest treatises of their kind in the ancient world. These provide an encyclopedic knowledge and analysis of plants (Gundersen 1918). Significantly and remarkably, Theophrastus wrote about growth, propagation, and the development of plants (for example, from seeds, grafting, and budding); environmental effects on fruits, trees, and other plants; meteorology and geology, and their relation to plant growth; the consequences of plant spacing to growth; he noted the movements of flowers and leaves at certain times of the year or day (now termed tropisms); the proper techniques for cultivation of some plants (including soil choice, trimming, watering, fertilizer choice/method, and weeding). He also noted that plants which grow too close together will both deplete the pool of available nutrients, and that “artificial and unnatural” forces impact on plants (such as through decay and disease), and finally on the odour and taste of different plants (now the subjects of sensory science) (Sengbusch 2003).

Earlier, Homer in *The Odyssey* (900 BCE) described fig, apple, pear and grape cultivation in the orchards of Alcinoos (Roach 1985).

The Romans were also strongly engaged in horticulture where the most notable publication is *De Materia Medica* (77 CE) by Dioscorides who identified many plants and described their medicinal value.

Horticultural crops were also featured strongly in the writings from Eastern cultures. For example, the culture of pears is recorded as far back as 2,500–3,000 years ago and peaches and plums are also mentioned from these times. Notable is description of the use of rootstocks and the selection of productive scions (Shen 1980).

Early plant scientists in the modern era who had a close involvement with horticultural crops included Carl Linnaeus (1707–1778; the new science of plant nomenclature), Charles Darwin (1809–1882; descriptions of geotropism and phototropism) and Gregor Mendel (1822–1884; establishing the foundations of modern genetics and breeding, using the garden pea as the main subject of study).

A number of the classic papers in horticultural science have been collated and represented by Janick (1989).

One of the most famous treatises in horticulture is *The Cyclopaedia of American Horticulture* by Liberty Hyde Bailey and Wilhelm Miller (1900), later reorganized and expanded as *The Standard Cyclopaedia of Horticulture* (1914). This huge work of 3,639 pages still remains a most useful resource for horticulture.

## ***Fruits and Vegetables***

Hundreds of books have been published on various horticultural crops and the different management practices that are associated with them. Many of these refer to the science that underpins current practices. Treatises on various aspects of horticultural crop management, including the description of tree training and pruning, grafting, and cultivar selection, for a crop such as apple, can be traced back to the early to mid seventeenth century (*see* Juniper and Mabberley 2006). These have texts with wonderful titles such as:

*A Treatise on Fruit Trees Shewing their Manner of Grafting, Pruning, and Ordering, of Cyder and Perry, of Vineyards in England* by J. Beale (1653).

*A Treatise of Fruit-Trees Shewing the Manner of grafting, Setting, Pruning, and Ordering of them in All Respects: According to Diverse New and Easy Rules of experience; Gathered in the Space of Twenty Years* by R. Austen (1657).

*Systema Agriculturae, the Mystery of Husbandry Discovered* by J. Worlidge (1669); and *The Art of pruning Fruit-Trees...with an Explanation of Some Words Which Gardiners Make Use of in Speaking of Trees. And a Tract of the Use of the Fruits of Trees, for Preserving Us in Health, or for Curing Us When We Are Sick. Translated from the French Original, Set forth in the Last Year by a Physician of Rochelle* by N. Venette (1685).

A typical characteristic of early fruit growing was the very large number of different cultivars that were grown on individual orchards. This provided a range of choices for the consumer throughout the season, diversity within the orchard to better cope with losses due to extreme weather and pest events, and the opportunity to store some better suited cultivars beyond the end of the production season. For fruit crops such as apple, this applied as much to fresh as it did to cider cultivars. One of the consequences of these practices was the publication of impressive texts that defined, in great detail, the characteristics of individual cultivars—the so-called “pomonas”. Good examples of such publications include:

*Pomona Londinensis Containing Coloured Engravings of the Most Esteemed Fruits Cultivated in British Gardens* by W. Hooker (1818); and

*The Herefordshire Pomona Containing Original Figures and Descriptions of the Most Esteemed Kinds of Apples and Pears* by R. Hogg. and H.G. Bull (eds) (1876–1885).

Some of the most famous pomonas in the twentieth century were organized by the New York State Experiment Station in a series known as the “*Fruits of New York*” including grapes (Hedrick 1908), plums (Hedrick 1911), cherries (Hedrick 1915), peaches (Hedrick 1917), pears (Hedrick 1921) and small fruits (Hedrick 1925). There are also pomonas in many other countries that are too numerous to list here.

A similar range of early references for vegetable production was also published and goes back to the seventeenth century, including:

*Kalendarium Hortense* by John Evelyn (1664);  
*Directions for the Gardiner* by John Evelyn (1686) (see Campbell-Culver 2009); and  
*History of cultivated vegetables: comprising their botanical, medicinal, edible, and chemical qualities; natural history; and relation to art, science, and commerce* by H Phillips (1821).

Modern books often form part of a series that is devoted to different fruit and vegetable crops—such as CABI Publishing’s “Crop Production Science in Horticulture” series with issues specialising in blueberries (Retamales and Hancock 2012), raspberries (Funt and Hall 2012), grapes (Creasy and Creasy 2009), olives (Therios 2008), bananas and plantains (Robinson and Galán Saúco 2010), peach (Layne and Bassi 2008), peppers (Bosland and Votava 2012), onions and other edible alliums (Brewster 2008), lettuce, endive and chicory (Ryder 1999), brassicas and related crucifers (Dixon 2007), tropical fruits (Paull and Duarte 2012), and citrus (Albrigo et al. 2012).

In another CABI series covering “botany, production and uses”, volumes are available, for example, on apples (Ferree and Warrington 2003), peppers (Russo 2012), avocados (Schaffer et al. 2013), mango (Litz 2009), and peach (Layne and Bassi 2008).

Other CABI texts cover topics such as *Principles of Tropical Fruit Production* (Midmore 2012), *Principles of Fruit and Nut Production* (Andrews 2013), and *Vegetable Production and Practices* (Welbaum 2013). They have also published a major *Encyclopaedia of Fruit & Nut Crops* (Janick and Paull 2006).

CRC Press offers texts on subjects such as propagation (Beyl and Trigiano 2008), tissue culture (Trigiano and Gray 2010), and organic farming (Barker 2010), a handbook on plant nutrition (Barker and Pilbeam 2006) and a dictionary of plant breeding (Schlegel 2009).

The publisher Elsevier (Academic Press) has a large catalogue of texts relating to fruits and vegetables within which there is an extensive series on diseases and pests including those on fruit crops (Alford 2007), lettuce (Blancard et al. 2006), mushrooms (Gaze and Fletcher 2007), peas and beans (Biddle and Cattlin 2007), tomatoes (Blancard 2012) and vegetables (Koike et al. 2006).

## ***Amenity Horticulture***

The fascination with plants for use as ornamentals, for cut flowers, and for landscaping in the western world stretches back to antiquity and the Renaissance. The design of ornamental gardens occurred in early civilisations, even preceding the Greeks and Romans, and included the use of plants for both food production and for purely leisure and aesthetic purposes. The Hanging Gardens of Babylon are likely the most recognised in this respect. The Egyptians, Persians, Greeks and Romans, followed by Byzantium and Moorish cultures all contributed elements to the design of managed gardens. In addition, Chinese and Japanese influences were very

important in eastern cultures. In the thirteenth through to the sixteenth centuries, the development of formal gardens was very significant in France, Italy and Spain through to the development of the Italian Renaissance garden and the very formal style of the Gardens of Versailles. These developments were succeeded by the English and French landscape gardens in the eighteenth century following which a number of other influences emerged in the nineteenth and twentieth centuries (see Rogers 2001).

In the eighteenth and nineteenth centuries, as some sections of society became more affluent, as voyages of global exploration dramatically increased, and as societies went through a particular fascination with the natural world, opportunities for new developments in landscape horticulture were markedly enhanced. It was an era when the activities of apothecaries, who were heavily reliant on plants and plant extracts for their profession, and the early horticulturalists converged. In addition, new wealth enabled landscaping on a massive scale for both private and public gardens. The voyages of discovery allowed the collection and display of plants which came to be admired and even celebrated in ways never before possible.

The origins of many current publications can be traced back to these times. *The Curtis Botanical Magazine* (now the *Kew Magazine*), with its wonderful coloured hand drawings of ornamental plants, was established in 1777. This history is described in considerable detail by Desmond (1987) including descriptions of the activities of the plant collectors of that time.

Throughout modern history, large treatises have been published to outline the botanical descriptions and horticultural uses of ornamental plants, flowers, trees and shrubs. Earlier versions of such publications included *An encyclopaedia of gardening; comprising the theory and practice of horticulture, floriculture, arboriculture, and landscape-gardening, including all the latest improvements; a general history of gardening in all countries* by J.C. Loudon (1828).

More recent volumes include the Royal Horticultural Society's series that includes *Plants and Flowers* (Brickell 2010), *Perennials* (Rice 2006), *Gardening* (Brickell 2007), and *the A-Z of Garden Plants* (Brickell 2003); or the Reader's Digest *Gardener's Encyclopaedia of Plants and Flowers—the Definitive Reference Work for Australia & New Zealand* (Macoboy et al. 2010); or The American Horticultural Society's *New Encyclopaedia of Gardening Techniques* (American Horticultural Society 2009).

Separate encyclopaedias are devoted to trees and shrubs—such as *Dirr's Encyclopedia of Trees and Shrubs* (Dirr 2011); the *Timber Press Encyclopedia of Flowering Shrubs* (Gardiner 2012); *The Hillier Gardener's Guide to Trees and Shrubs* (Kelly 2004); and *Techniques du Jardinier L'encyclopédie* (Bureaux 2011).

A characteristic of horticulture publications is that books can be identified that cover almost any specific group of ornamental plants ranging, for example, from roses: *The Ultimate Rose Book* (Macoboy 2007), the American Rose Society *Encyclopedia of Roses* (Quest-Ritson and Quest-Ritson 2010); to perennials (*Encyclopedia of Perennials* (Rice 2006), *Rodale's Illustrated Encyclopedia of Perennials* (Phillips and Burrell 1999), *Armitage's Garden Perennials* (Armitage 2011)); orchids (*Botanica's Orchids: over 1200 species* (Botanica 2002), *The*

*Illustrated Encyclopedia of Orchids* (Pridgeon 1992)); and bulbs (*Bulbs* (Bryan 2002), and *The Complete Practical Handbook of Garden Bulbs: How to create a spectacular flowering garden throughout the year in lawns, beds, borders, boxes, containers and hanging baskets* (Brown 2009)).

Notwithstanding these very large books on various aspects of ornamental plants, there are equally a considerable number of very small but authoritative texts in this field, such as The Timber Press Pocket Guide Series that includes volumes on topics such as conifers (Bitner 2010), hostas (Grenfell and Shadrack 2007), bamboos (Meredith 2009), palms (Riffle 2008) and shade perennials (Schmid 2004). Similarly, the Expert Books' series includes separate books on lawns, flowering shrubs, trees and shrubs, greenhouses, house plants, fruit, vegetables and herbs (e.g., Hessayon 1991 and 1997).

Landscape architecture is a highly specialised area of horticulture that has its own extensive literature which records developments over recent centuries, links those developments with changes in societies and across different cultures, and relates the management of green spaces to changes in building architecture and art.

Harvard University Press has published an interesting series on landscape, history and cultures that form the Dumbarton Oaks Colloquium Series in the History of Landscape Architecture. Titles include the following:

*Botanical Progress, Horticultural Innovations, and Cultural Changes* (Conan and Kress 2007);

*Sacred Gardens and Landscapes—Ritual and Agency* (Conan 2007); and

*Perspectives on Garden Histories* (Conan 1999).

Other titles from the same publisher, but not in the series, include:

*Gardens, City Life, and Culture: A World Tour* (Conan and Wangheng 2008); and

*Gardens and Cultural Change—A Pan American Perspective* (Conan and Quilter 2008).

A significant characteristic of the last 60 to 80 years has been the urbanisation of societies. This has brought with it the development of urban landscaping within major cities where special attention has been given to landscaping freeways and city streets through to the development of roof-top gardens that are used primarily for “green spaces” but also for the production of food. Publications specific to these applications of horticulture include:

*Rooftop Gardens: the Terraces, Conservatories, and Balconies of New York* (Calicchio and Amon 2011); and

*Skygardens: Rooftops, Balconies and Terraces* (Nielsen 2004).

## ***Horticulture and Health***

The present-day emphasis on horticulture and health has an ancient tradition based on medicinal uses of plants and diet (Daunay et al. 2009; Janick and Hummer 2010). Plant cures have long been a basic component of medicine and there are treatises

found in ancient Sumer, Egypt, Greece, China, India, and Mesopotamia. The Greek herbal of Pedanius Dioscoredes of Anazarba written in the year 65 lists health-giving properties of 500 plants and an illustrated version from 512 known as the *Juliana Anicia Codex* survives and became the basis of the illustrated herbal tradition in the Renaissance (Arber 1965; Janick and Hummer 2012). Botany, horticulture, and medicine were essentially in step during the eighteenth century when each turned scientific and from this juncture botanical works would essentially ignore medicinal uses while medicinal works were devoid of plant lore. However, the medicinal use of plants continues as an alternate form of medicine and remains popular to the present day despite the questionable efficacy of many popular herbs and the reliance of a number of herbal recommendations on superstition and astrology. The *Journal of Natural Products* (original *Lloydia*), the official journal of the American Society of Pharmacognosy (now co-published by the American Chemical Society), contains many articles on the medicinal chemistry of horticultural plant products, many of pharmaceutical interest.

The importance of horticulture to the overall mental health and wellbeing of humankind has received increasing attention over the past two decades as positive aspects of horticultural therapy have received more attention and as the negative aspects of high density housing, the absence of “green spaces” in modern cities has increased, and as the relationships between human behaviour and the natural environment have become better understood. Authors such as Kaplan and Kaplan (1982), Kellert and Wilson (1995) and Lewis (1996) have explored and defined these issues.

## Extension Publications

### *Twentieth Century*

An iconic feature of government and state-funded extension services throughout the twentieth century was the large number of well prepared and well presented extension bulletins and advisory booklets that were produced for producers in various horticultural industry sectors. These were a particular feature of national departments of agriculture in countries such as the USA, the United Kingdom, New Zealand, Australia and Canada. Their preparation and distribution was also a key element within the activities of agricultural and horticultural faculties in US Land Grant Universities, especially in states such as California, New York, Michigan, Ohio, Massachusetts, North Carolina, Georgia, Florida, Texas, and others. These publications, which were usually distributed free of charge, covered many different production-related subjects. They were developed over a number of years and revised frequently by specialists who had often spent decades working in their respective fields. Consequently, these extension publications were the most current, up-to-date and validated sources of reliable information that were

available to local producers. They were also prepared independently of any commercial influences.

Throughout the 1990s and 2000s a number of these publications became unavailable in printed form but were rapidly transferred to on-line web-based versions. A number of these remain but the range now available is markedly reduced.

The disbanding of government support for agricultural advisory services in the later part of the twentieth century and the early part of the twenty-first century in many countries has seen an immediate loss of such services and with that a cessation of the publication of such helpful and at times critical information for producers. In some instances, this loss of independent state-funded information has been replaced with proprietary sources such as those from fertilizer and seed companies, as well as from private consultants (but in that case only to fee-paying clients).

Some of the professional societies that are associated with horticultural science do continue to publish technical material which is of direct relevance to industry. For example, the American Society for Horticultural Science publishes a number of works on different crops such as watermelons (Maynard 2001) as well as those on subjects such as weed management (McGiffen 1997) and organic composting (Tyler 1996). The Entomological Society of America publishes volumes on subjects that include, for example, a handbook on turfgrass insect pests (Brandenburg and Villani 1995) while the American Phytopathology Society publishes texts on plant diseases such as those on chrysanthemum (Horst and Nelson 1997), rhododendron (Coyier and Roane 1986) and herbaceous perennials (Gleason et al. 2009).

### ***Industry Publications***

Many industry groups around the world publish magazines on a regular basis that disseminate information to producers about the application of recent research discoveries, technical details about new products and new cultivars, market intelligence, and industry politics. Plant nursery catalogues are often a very good source of information about the origins and timings of new plant introductions into a country or region as well as informing about the introduction of new cultivars of a particular crop. Examples of such publications are shown in Table 37.4. Some of these have been produced for many decades including the *Gardener's Chronicle*—now *Horticulture Week* - which began publication in 1841 and the *American Fruit Grower* which began in 1880.

### **Gardening**

Gardening provides an important leisure activity for many people around the world. The results of these endeavours include a beautification of the landscape for both personal and public enjoyment, the production of fruit and vegetables for personal

**Table 37.4** Selected industry magazines devoted to fruit, vegetables, nursery production and gardening

Publication title	Country of origin	Publishing entity	Year established	Publication frequency
<b>Fruit</b>				
Good Fruit Grower	USA	Washington State Fruit Commission	1946	17 times a year
American/Western Fruit Grower	USA	Meister Media Worldwide	1880	Monthly
Fruit Growers News (FGN) (formerly Great Lakes Fruit Growers News)	USA	Great American Media Services	1974	Monthly
The Orchardist of New Zealand	New Zealand	Horticulture New Zealand	1926	Monthly (11 issues)
The Fruit Grower	United Kingdom	ACT Publishing	1986	Monthly
European Fruit Magazine	Poland	Plantpress Ltd	2009	Monthly (published in german, dutch and english)
The Fruit Grower	United Kingdom	ACT Publishing	1986	Monthly
<b>Vegetables</b>				
<b>NZ Grower</b>				
American Vegetable Grower	New Zealand	Horticulture New Zealand	1945	Monthly (11 issues)
Vegetable Grower News (VGN)	USA	Meister Media Worldwide	1908	Monthly
The Vegetable Farmer	USA	Great American Media Services	1966	Monthly
	United Kingdom	ACT Publishing	1989	Monthly
<b>Nursery production and gardening</b>				
Australian Horticulture	Australia	Rural Press Ltd, Australia	1903	Monthly
Commercial Horticulture	New Zealand	The Reference Publishing Company	1967	Bi-monthly
American Nursery Magazine	USA	American Nurseryman Publishing co.	1904	Monthly
Canadian Garden Centre & Nursery Magazine	Canada	Annex Business Media	2006	Monthly
The Garden	United Kingdom	The Royal Horticultural Society	1964	Monthly
The Plantsman	United Kingdom	The Royal Horticultural Society	1994	Quarterly
Horticulture Week	United Kingdom	Haymarket Publications	1841 as Gardeners' Chronicle and absorbed the Grower in 2006	Weekly

consumption, physical exercise and recreation for the participants, and in the case of community gardens, social interaction amongst those involved. It can range in scale from many hectares where the managed spaces surround private homes or where the garden is an integral part of the larger landscape, to small green spaces on rooftops of modern apartments. Gardening as a leisure activity and as an art form is practised in many different countries throughout the world and is as strong in many eastern countries as it is in western ones.

Those involved in gardening receive their information and inspiration from a number of sources including membership of garden clubs, television programs, magazines and newspapers, and of course from books. A number of such books are covered in the sections above that refer to fruit crops, vegetables, and ornamental plants. Examples of other significant texts include:

*Complete Idiots Guide to Small-Space Gardening* (McLaughlin 2012);  
*The Complete Gardener* (Don 2009);  
*The Blooming Great Gardening Book—A Guide for All Seasons* (Whysall 2000);  
*The New Encyclopedia of Gardening Techniques* (American Horticultural Society 2009);  
 and  
*RHS How to Grow Practically Everything* (Royal Horticultural Society 2010).

Particular styles of gardening can be recognised as being influenced by specific countries such as Japan. As a consequence, books have been published that describe in detail the history and nature of those gardens (e.g. Keane (2007); Ohashi (2000)) while others cover the ways in which those styles and principles can be applied in a western context (e.g. Kawaguchi 2008). Similarly, French gardens have had a major influence on the design of gardens elsewhere in the world (e.g. Babelon and Chamblas-Ploton (2001) and Smithen (2002)).

## Food Guides and Cookbooks

An unusual but significant segment of literature that relates to horticulture is that of food guides and cookbooks that focus on the use of fruits and vegetables in human diets. Cookbooks have an ancient tradition (Darby 2003) and are a very useful source of information on horticultural crops. With the growing awareness of the critical importance of horticultural crops for providing essential minerals, vitamins and other active compounds in diets and for enhancing health, this segment of literature has grown markedly in recent years. This awareness has been enhanced within many communities through “5 plus a day” nutrition programmes and through the promotion of specific crops with high concentrations of known or claimed health-enhancing compounds such as antioxidants and bioflavonoids.

Some texts provide general information about such properties across a range of crops (Heaton 1997; Watson and Preedy 2009) while others are very specific—for example, for crops and products such as olives and olive oil (Preedy and Watson 2010) or oriental vegetables (Larkcom 2008). Other texts provide information on

cooking in general with fruit and vegetables or for maintaining a vegetarian diet (Bittman 2007; Madison 2007).

## Horticulture in Literature

References to horticultural crops and practices in literature are so widespread that only a brief sampling can be provided here. In the following, we use examples of horticultural allusions from Sumer, Homer's *Ulysses*, Laws of Hammurabi, various "bibles" including the Hebrew bible, the New Testament, and the Qu'ran, Arab poetry, different authors such as Shakespeare, Jane Austin, and James Joyce as well as references which are the source of popular and well-used sayings that allude to horticulture.

### *Ancient Sumer*

The Disputation between the Hoe and the Plow, dated from ca. 2500 BCE is perhaps the first poetic statement contrasting the state of the ordinary folk with the exalted and wealthy based on agricultural metaphors. The common man represented as the hoe argues his status against the rich and mighty (represented as the plow). The following translation is found in Hallo (2002). Only three of about 25 "stanzas" are presented.

Hoe picked a quarrel with the Plow. Hoe and Plow—this is their dispute.  
Hoe cried you to Plow

O Plow, you draw furrows—what is your furrowing to me?  
You make clods—what is your clod making to me?  
You cannot dam up water when it escapes.  
You cannot heap up earth in the basket.  
You cannot press clay or make bricks.  
You cannot lay foundations or build a house.  
You cannot strengthen an old wall's base.  
You cannot put a roof on a man's house  
O Plow, you cannot straighten a street.  
O Plow, you draw furrows—what is your furrowing to me?  
You make clods—what is your clod-make to me?

The Plow cries out to the Hoe "I am Plow, I was fashioned by the great owers,  
assembled by noblest hands!  
I am the might registrar of God Enlil!  
I am the faithful farmer of Mankind!  
At the celebrations of my harvest-festival in the field,  
Even the King slaughters cattle for me, adding sheep!  
Drums and tympan sound! The king himself takes hold  
of my handle-bars;  
My oxen he harnesses to the yoke:  
Great noblemen walk at my side;

The nations gaze at me in admiration,  
Land watches me in Joy!

### *Ancient Greece*

Homer in the *Odyssey*, ninth century BCE, refers to the Garden of Alcinöus owned by the King of the Phaeacians, a legendary country, which is rich in descriptions of fruit trees.

And without the courtyard by the door is a great garden, of four plough-gates, and a hedge runs round on either side. And there grow tall trees blossoming, pear-trees and pomegranates, and apple-trees with bright fruits, and sweet figs, and olives in their bloom. . . . Pear upon pear waxes old, and apple on apple, yea, and cluster ripens upon cluster of the grape, and fig upon fig. . . . . These were the splendid gifts of the gods in the palace of Alcinöus. The *Odyssey* Book VII, Hedrick 1921.

### *Mesopotamia*

The Laws of Hammurabi (1750 BCE) predate the mosaic ten commandments. Laws 64 and 65 relate to pollination of date palm are clearly quite sophisticated legally and might be considered the beginning of agricultural economics.

64. If a man give his orchard to a gardener to pollinate (the date palms), as long as the gardener is in possession of the orchard, he shall give to the owner of the orchard two thirds of the yield of the orchard, and he himself shall take one third.

65. If the gardener does not pollinate the (date palms in the) orchard and thus diminishes the yield, the gardener (shall measure and deliver) a yield of the orchard to (the owner of the orchard in accordance with) his neighbor's yield.

### **Biblical References**

The Hebrew bible is rich in allusions to viticultural practices and wine making.

Now will I sing to my wellbeloved a song of my beloved touching his vineyard. My well beloved had a vineyard in a very fruitful hill. And he fenced it, and gathered out the stones thereof, and planted it with the choicest vine, and built a tower in the midst of it, and also made a winepress therein: and he looked that it should bring forth grapes, and it brought forth wild grapes. And now...judge...betwixt me and my vineyard. What could have been done more to my vineyard, that I have not done in it? Wherefore, when I looked that it should bring forth grapes, brought it forth wild grapes?

Isaiah 5:1-7 & 10

Protection of grapes from birds and thieves is a common feature of the early cultivation of wine, and the construction of walls and towers is associated with vineyards in ancient Israel. Various techniques were developed for over-wintering, including covering sprawling vines with soil, techniques that still exist in Afghanistan. Grapes were preserved by sun drying to produce raisins, or by transforming grape juice to wine. The culture of grapes and the technology of wine making are common themes in biblical writings, and become infused in Jewish and Christian religious practices and social encounter. Wine was associated with blessings and joy, although drunkenness was frowned upon. Grapes and raisins are highly prized in the Qu'ran and although wine is prohibited in Islam "*rivers of wine*" are promised in Paradise.

Olive, along with grape, is the most mentioned fruit in the Hebrew bible and their importance permeated the western world. The olive tree became a symbol of beauty, freshness, fertility, wealth, fame, and peace. Its importance is reflected in the widespread use of oil for religious purposes such as consecration ceremonies (anointing) in Judaism and Christianity; the word messiah (Christ) literally means "the anointed one." Although grafting is not referred to in the Hebrew bible, grafting of olive is mentioned in the New Testament:

And if some of the branches be broken off, and thou, being a wild olive tree, wert grafted in among them, and with them partakest of the root and fatness of the olive tree... For if thou were cut out of the olive tree which is wild by nature, and were grafted contrary to nature in a good olive tree: how much more shall these, which be the natural branches, be grafted into their own olive tree?

Romans 11:17 & 24

Fig is another iconic Mediterranean fruit that some believe was the original tree of knowledge in the Garden of Eden.

A certain man had a fig tree planted in his vineyard; and he came and sought fruit thereon, and found none. Then said he unto the dresser [cultivator] of his vineyard, Behold, these three years I come seeking fruit on this fig tree, and find none; cut it down; why cumbereth it the ground? And he answering said unto him, Lord, let it alone this year also, till I shall dig about, and dung it: And if it bear fruit, well: and if not, then after that thou shalt cut it down.

Luke 13:6-9

Finally, horticultural metaphors are associated with love making in the *Song of Songs*:

An oh, may your breasts be like clusters  
Of grapes on a vine, the scent  
Of your breath like apricots,  
Your mouth good wine—

## *Arab Poetry*

Medieval Arab poetry often uses horticultural allusions. In 1123, the eggplant (*Solanum melongena*) inspired the poet Ibn Sara of Santarem (now Portugal) to write the following:

Spheroid  
Fruit, pleasing

To Taste, fattened  
 By water gushing in all  
 The gardens, glossy cupped  
 In its calyx, ah heart  
 Of a lamb in  
 A vulture's claws  
 translated by C. Middleton and L. Garzon Falcon (1997).

Compare this to a modern poem on the same subject by an anonymous author.

Who am I?  
 My skin is black and glossy,  
 It can be white as snow.  
 Sometimes I'm plump and saucy.  
 My roots go down below.

I reach out for the burning sun,  
 But grovel in the dirt.  
 My daggers will pierce anyone,  
 I draw blood and hurt.

My flesh is bitter, spicy,  
 But kiss me just the same.  
 Caress me, be not icy,  
 I dare you speak my name.

## *Chinese Poetry*

Chinese poets referred to many different horticultural crops and ornamental plants in early writings. Two examples follow.

During the Tang dynasty (618–906 CE), the lychee was celebrated and treated as a delightful exotic fruit in poetry and art and enjoyed great prestige. The lychee was so greatly favored by Emperor Xuan-zong's concubine, Yang gui-fei, that he had couriers on speedy horses from Szechwan province deliver fruit to the capital of Chang-an.

From Changan the palace embroidered the scene,  
 On the mountain top palace gates opened one by one,  
 One horse rider kicking up red dust, the concubine laughs,  
 No one knew it was the lychee express arriving!

The green trees of Xinfeng covered with dust,  
 As the emissaries to Yuyang returned with favorable news.  
 The sounds of Rainbow Feather Shawl embraced the peaks,  
 And graceful dancing feet trampled the nation.  
 Passing the Hua Qing Palace by Du Mu (803–852)

Another important Tang Dynasty poet was Meng Haoran who wrote strongly of pastoral life and leisure.

Preparing me chicken and rice, old friend,  
 You entertain me at your farm.  
 We watch the green trees that circle your village

And the pale blue of outlying mountains.  
 We open your window over garden and field,  
 To talk mulberry and hemp with our cups in our hands.  
 ... Wait till the Mountain Holiday—  
 I am coming again in chrysanthemum time.  
 Stopping at a Friend's Farmhouse by Meng Haoran (689 or 691–740)

## *Shakespeare*

William Shakespeare (1533–1603) is considered the greatest writer in English if not in any tongue. His plays and poems are a rich source of horticultural information in the Elizabethan period (Ellacomber 1884). Of all nature's images, the greatest number is devoted to horticulture (Spurgeon 1935). The bard displays an intimate knowledge of plant growth, propagation, grafting, pruning, manuring, weeding, ripeness, and decay. Almost 200 plants are referenced. The following two garden scenes are rich in horticultural imagery.

In Richard II, the mismanagement of England is reflected in a conversation between two gardeners.

Go, bind thou up yon dangling apricocks,  
 Which, like unruly children, make their sire  
 Stoop with oppression of their prodigal weight;  
 Give some supportance to the bending twigs.  
 Go thou, and like an executioner,  
 Cut of the heads of too fast growing sprays,  
 That look too lofty in our commonwealth:  
 All must be even in our government.  
 You thus employed, I will go root away  
 The noisome weeds, with without profit suck  
 The soil's fertility from wholesome flowers.  
 Richard II. III.iv

In a rural scene in Bohemia from *The Winter's Tale*, Perdita, unknown to her the daughter of King Leontes, King of Sicilia, has being abandoned and is being brought up by shepherds due to the supposed infidelity of his wife by his friend, Polixenes. In this scene, the falsely accused Polixenes, King of Bohemia, checks out Perdita for his son who has fallen in love with her. In a famous repartee concerning streaked gillyvors (variegated carnation) which Perdita assumes to be due to either unnatural breeding or grafting, a philosophical discussion ensues on the nature of what is natural and what is unnatural. Perdita, as many today, will have none of it. This controversy still resonates in horticulture.

Perdita  
 Sir, the year growing ancient,  
 Nor yet on summer's death, nor on the birth  
 Of trembling winter, the fairest  
 Flowers o' the season  
 Are our carnations and streak'd gillyvors  
 Which some call nature's bastards: of that kind  
 Our rustic garden's barren; and I care not

To get slips of them.

Polixenes  
Wherefore, gentle maiden,  
Do you neglect them?

Perdita  
For I have heard it said  
There is an art which in their piedness shares  
With great creating nature.

Polixenes  
Say there be;  
Yet nature is made better by no mean  
But nature makes that mean: so, over that art,  
Which you say adds to nature, is an art  
That nature makes. You see, sweet maid, we marry A gentler scion to the wildest stock,  
And make conceive a bark of baser kind  
By bud of nobler race; this is an art  
Which does mend nature, change it rather, but  
The art itself is nature.

Perdita  
So it is.

Polixenes  
Then make your garden rich in gillyvors,  
And do not call them bastards.

Perdita  
I'll not put  
The dibble in earth to set one slip of them;  
No more than were I painted, I would wish  
This youth should say, 'twere well, and only therefore  
Desire to breed by me.  
The Winters Tale IV.iv

Other notable extracts from Shakespearian works include:

That which we call a rose  
By any other name would smell as sweet  
Romeo and Juliet II.ii

When I have plucked the Rose,  
I cannot give it vital growth again.  
It needs must wither. I'll smell it on the tree  
Othello V. ii

My salad days  
When I was green in judgement  
Anthony and Cleopatra I.v

Mine eyes smell Onions, I shall weep anon  
All's Well that Ends Well V.iii

This is the state of man: today he puts forth  
The tender leaves of hopes, to-morrow blossoms,  
And bears his blushing honors thick upon him:  
And third day comes a frost, a killing frost

And, when he thinks, good easy man, full surely  
 His greatness is a-ripening, nips his root,  
 And then he falls, as I do  
 Henry VIII, III,ii.

Rough winds do shake the darling buds of May.  
 Sonnets XVIII.

### *Jane Austen*

This quintessential and still beloved nineteenth century British author of manners, is known for her table talk and horticulture and gardens are frequently referenced. In *Mansfield Park*, she alludes to a well known apricot named ‘Moor Park’ and provides information on the cost of the tree:

Sir it is a Moor Park, we bought it as a Moor Park, and it cost us—that is, it was a present from Sir Thomas, but I saws the bill—and I know it costs seven shillings, and we charged as a Moor Park.

You were imposed on, ma’am replied Dr. Grant. “these potatoes have as much the flavour of a Moor Park, as the fruit from that tree. It is an insipid fruit at the best, but a good apricot is eatable, which none from my garden are.”

“The truth is, ma’am” said Mrs. Grant, pretending to whisper across the table to Mrs. Norris, “that Dr Grant hardly knows the nature of taste of our apricot is, he is scarcely ever indulged with one, for it is so valuable a fruit, with a little assistance, and ours is such a remarkable large fair sort that what with early tarts and preserves, my cook contrives to get them all.”

### *James Joyce*

Finally we include a reference to melons in *Ulysses*, Joyce’s masterpiece that describes a single day, June 16, 1904, in Dublin. This choice verbally wild snippet can be considered a sampling of the rich use of horticultural imagery in sensual and erotic literature:

He kissed the plump mellow yellow smellow melons of her rump, on each plum melonous hemisphere, in their mellow yellow furrow, with obscure prolonged provocation melon-smellonous osculation.

### *Aphorisms and Proverbs*

Many references are made to horticulture in common speech, proverbs, and aphorisms. These include references to fruits, vegetables, and flowers as well as to various horticultural practices such as pollination, grafting, and weeding. These sayings

and proverbs have many different and varied sources. The meaning and origins of the proverbs can be found in texts such as Pickering (2001).

Selected examples include the following:

Life is just a bowl of cherries

-by Ray Henderson, song with lyrics by Lew Brown (1931)

Rose is a rose is a rose.

-Gertrude Stein: Sacred Emily.

Cauliflower is nothing but a cabbage with a college education.

-Mark Twain: Pudd'nhead Wilson (1894)

An apple a day keeps the doctor away (English)

If apples bloom in May, you may eat them night and day (English)

April showers bring forth May flowers (English)

Apples, pears and nuts spoil the voice (Italian)

The apple never falls far from the tree (German)

Like tree, like fruit (English)

A good tree brings forth good fruit (English)

The best wine comes out of an old vessel (English)

Cabbage twice cooked is dead (Greek)

There is a devil in every berry of the grape (English)

If you would enjoy the fruit, pluck not the flower (English)

Great trees keep down little ones (English)

The higher the tree, the sweeter the plum (English)

Old friends and old wine are best (English)

Soon ripe, soon rotten (Roman)

Walnuts and pears you plant for your heirs (Greek)

The rotten apple injures its neighbours (English)

One generation plants the trees; another gets the shade (Chinese)

No matter how tall the tree is, its leaves will always fall to the ground (Chinese)

Flowers leave a part of their fragrance in the hands that bestow (Chinese)

A flower cannot blossom without sunshine nor a garden without love (Chinese)

A beautiful flower is incomplete without its leaves (Chinese)

Peach and chestnut bear fruit three years after germination while persimmon takes eight years to bear first fruit after germination. (A long time is necessary to accomplish something valuable). (Japanese)

It is stupid to prune ornamental cherry trees while it is stupid not to prune Japanese apricot trees. (Japanese)

## The Future

The scholarship and literature of horticulture, although scattered, had long been preserved in part in specialized libraries. These include, but are not limited to, such collections at the Royal Horticultural Society in London (Lindley Library), St George's Chapel Windsor Archives, The British Library, Natural History Mu-

seum Library, The Garden History Museum, Royal Botanic Garden Kew, Royal Botanic Garden Edinburgh, the National Agricultural Library of the United States in Beltsville Maryland, The Dumbarton Oaks collection in Washington DC, The Arnold Arboretum Horticulture Library at Harvard, Jamaica Plain, Massachusetts, The library of the Missouri Botanical Garden in Saint Louis, The Lloyd Library in Cincinnati, Ohio, and the German Horticultural Library in Berlin. Many of these libraries have very special collections, for example the National Library in Beltsville contains a huge record of nursery catalogues used in the United States. In the past it was often difficult and expensive to access the horticultural literature but the recent digitization of all scientific and horticultural literature is transforming and easing this situation.

The publication of scientific journals and books has undergone major changes in the past decade with the advent of web-based search options and the personal computer. Most if not all scientific journals are now available on-line either prior to being printed or certainly soon afterwards. As a consequence, research findings are not subject to the same delays due to printing and distribution requirements. Many subscribers now choose to elect for electronic on-line delivery (usually at a lower cost) rather than delivery of a printed version of the same material. The same has occurred with the evolution of e-books.

The direct use of the world-wide web as a repository of technical information is expanding rapidly. Such material typically includes text and graphics, but increasing includes video material and sophisticated imagery. For example, a current search on “apple grafting” will result in identifying close to 1 million entries on the web ranging from encyclopaedic entries such as Wikipedia (<http://en.wikipedia.org/wiki/Grafting>) which includes pertinent published references, YouTube videos of grafting practices (<http://www.youtube.com/watch?v=LTqG8-OhEiY>), and over 400 photographic and diagrammatic images of grafts, grafting tools, and different grafting methods. However, printed material will remain important as a means of summarising, validating, and interpreting the enormous literature of horticulture in an authoritative and informed way.

The literature of horticulture is rich and diverse. It has impacted our lives for centuries and is likely to do so for centuries to come.

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