

## THE DEVELOPMENT AND HISTORY OF HORTICULTURE

**Edwinna von Baeyer**

*131 Sunnyside Avenue, Ottawa, ON K1S 0R2, Canada.*

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### Contents

1. Introduction
  2. What is horticulture?
  3. The beginnings: the Neolithic Age
  4. Egypt: birthplace of horticulture
  5. Pre-Columbian Central and South American horticulture
  6. Greek and Roman advances
  7. China and Japan: horticultural centers of the Far East
  8. Middle Ages in Europe up to the 1400s
  - 8.1 Increasing Cross-fertilization between World Regions
  9. Advancements during the Renaissance, 1400-1600
  10. Horticultural science on the rise, 1600s-1700s
  11. Market garden history overview
  12. The Industrial Revolution and up into the 1800s
  - 12.1 Machine Power
  - 12.2 Plant Exploration
  - 12.3 The Home Garden
  - 12.4 New Lands, New Crops
  - 12.5 Supports for the Advancement of Horticulture
  13. 1900s and into the 21<sup>st</sup> century
  - 13.1 Chemicals
  - 13.2. Plant Breeding
  - 13.3. Refrigeration and Storage
  - 13.4. Plastics
  - 13.5. Standardization and Regulation
  14. Conclusion
- Glossary  
Bibliography  
Biographical Sketch

### Summary

The history of horticulture is traced as it gradually developed independent of agriculture, into the sophisticated art and science that it is today. The article, given the wide scope of time, major events and geographic range, can only touch on the main themes that illustrate how horticulture has changed and advanced since it began nearly 20,000 years ago. These themes include the development of specialized tools and practices, the highlights of the progression of horticulture in the world's centers of

agricultural/horticultural development; the rise of market gardening and commercial horticulture; the exchange of food and ornamental plants from one world region to another; the rise of scientific observation; the impact of switching from manual labor to machine power; and the scientific advances of plant breeding that have moved from the field and into the laboratory. As well, major impacts, especially from the 19<sup>th</sup> century onwards, are discussed. These impacts include the influence of horticultural societies and specialty associations; the advances in refrigeration and storage; the support of the media; the rise of the use of chemicals and plastics; and the call for standardization and regulation in today's globalized industry.

## 1. Introduction

The history and evolution of horticulture is intimately connected to the history and development of agriculture. As such, horticulture is part of the story of humanity's desire to gain control over nature. This story encompasses exploration, conquest, experimentation, innovation and globalization. This is such a huge story that many aspects, such as the fascinating history and development of landscape design, the huge popularity of leisure-time home gardening and of the introduction of various plants – economic and ornamental – into different areas of the world, can only be touched on. This paper will mainly look at the advancements that took horticulture out of the realm of myth and superstition and into a science-based discipline. These advancements occurred slowly and unevenly around the world.

## 2. What is Horticulture?

Horticulture [Latin: *hortus* (garden) + *cultura* (culture)] is defined as the art and science of growing fruits, vegetables, herbs, nuts and ornamental plants (trees, shrubs, flowering plants and turf). The separation of horticulture from agriculture as a distinct activity is usually dated from the Middle Ages in Europe. Although horticulture and agriculture have many practices in common (weeding, fertilizing, watering, etc.), horticulture is distinguished from agriculture by its specialized practices, for example, grafting, and by the smaller scale of its operations.

Horticulture can be divided into three main sectors: fruit growing (pomology); market gardening (vegetables and herbs) and ornamentals cultivation (flowers, shrubs, trees). The cultivation of ornamental plants, which some call floriculture and landscape horticulture, can be further divided, for example, into arboriculture (woody plants) and floristry. Nut cultivation (used to produce oils, fats and ornaments) and grape growing (viticulture) are smaller horticultural divisions.

## 3. The Beginnings: The Neolithic Age

Prehistoric humans were originally nomadic hunter-gathers who followed the migration of animals and the ripening of foods, such as berries, in order to feed themselves. The Neolithic Age was a watershed time for the development of agriculture and horticulture. Scholars have found evidence that hunter-gatherers, about 20,000 years ago, had begun the slow trial-and-error process of domesticating wild plants and animals. Over thousands of years, our ancestors changed their life style from nomadic food collection

to settled food production. Agriculture requires staying in one place to oversee cultivation, harvest and storage. As well, growing fruit is a long-term process that necessitates year-round care.

Although the rise of agriculture is mostly described as a great benefit that allowed human society to evolve, according to recent scholarship, it has also had a number of negative effects over past millennia. Agriculture certainly allowed people to settle in communities and to regularize their food supply. However, as Kiple (2007) observes, one of the negative effects was that the hunter-gatherer's diet, which used between 100 and 200 plant species in season, was reduced and replaced by a dependence on fewer plants – those that grew best in a local area. Changing from a mainly meat diet to one high in carbohydrates and plant nutrients led to famine, nutritional diseases and crowded living conditions, which eventually led to plague and pestilence.

Agriculture itself is dated as beginning about 10,000 years ago, more or less independently, in seven to nine major centers, mainly in the river valleys of the Tigris-Euphrates, Indus and Nile, and in China, Mesoamerica, and East and West Africa. Not only was fire discovered, but also all our major crops were domesticated as early as 3000 BCE (Before the Common Era). More than half of the world's food crops, including turnips, onions, carrots, lettuce, apples, pears, quince, bananas, peach, citrus fruits and almonds, originated in Asia in the centers of development. From the Mediterranean centers came cabbage, broccoli and cauliflower. From Mesoamerica came corn, beans, tomato, cacao, squash, sweet potato, avocado and potatoes. Huxley (1978) believes that the first plant to be manipulated was the grape vine and that wine was probably first made in 6000 to 4000 BCE. By 6700 BCE, a fully agricultural economy that relied almost entirely on farming and herding was established over much of the Near East.

One of the earliest writings on the healing properties of certain plants was discovered on a tablet created in about 2100 BCE during the Sumerian civilization. As well, one of the earliest written lists of vegetables and herbs is found on the Tablet of Marduk-shumaidin, probably dating from the 7th century BCE in Babylon, predating the Hanging Gardens of Babylon. The tablet, entitled "The garden of King Marduk-apla-iddina. Written and collated according to its original," listed the plants in the garden of Babylonian king Marduk-apla-iddina, who reigned from 721 to 710 BCE and again briefly in 703 BCE. The plants are listed in four columns, about 20 names per column. Potts was able to translate the following plant names from the list: garlic, onion, leek, lettuce, beet, cucumber, radish, herbs and spices, dill, mint, safflower or bastard saffron, coriander, thyme, hyssop and asafetida.

At first, through hard manual labor, crops were grown on land next to dwellings and gradually spread out into the countryside. Smaller gardens, what are defined today as kitchen gardens, and fruit orchards also came to be cultivated closer to the house. There is not a precise date for when houses began to have enclosed yards where vegetables and fruits were grown. However, by the 3<sup>rd</sup> millennium BCE, archeological evidence shows that vegetable and fruit gardens in Sumeria were enclosed and that vegetables were grown in rows and were watered by irrigation.

The earliest agricultural/horticultural tools also date from the Neolithic Age. Around 40,000 BCE, our gardening ancestors were already using bone digging sticks, the precursor of the shovel, to dig in soft soils, and the pick-like mattock, to break up hard soil. The stone hoe was seen as early as the 5<sup>th</sup> millennium BCE. The plow, developed in the Near East, was a later invention and is dated between 5000 and 4800 BCE. Metal implements made of bronze were first used, with the discovery of iron, by 1100 BCE in Mycenae, and wrought iron implements were known by 1200 BCE in the Near East.

Agriculture and horticulture continued to evolve together in a trial-and-error manner up into the Middle Ages. Plants and crops were observed to see which would survive and under what conditions. Weeds were identified, as were pests and diseases. Treatments ranged from sacrificing animals to ward off disease and pestilence to handpicking noxious insects off plants. All labor was done by hand or with the help of animal power. In many cultures, women were the main garden cultivators, while men usually worked in the fields. In many countries today, women continue to hold this role.

Cultivators over the centuries have adapted their practices to their climates and conditions to maximize land resources, for example, as seen in the extreme terracing in the foothills of the Himalayas or the creation and cultivation of “floating” gardens. In Mexico, these long, narrow artificial islands, called chinampas (some floating and moveable, others fixed), were developed by the Aztecs by building up layers of grass, lake bottom mud and soil. Chinampas were first developed in an area near what is known today as Mexico City (near Lake Texoco), where there was an abundance of lakes and rivers, but little arable land. The Aztecs had pursued this land reclamation at least by 1325, but the first written descriptions were first recorded by Spanish explorers in the early 1500s. Corn, herbs, tomatoes, beans, chilies, avocado, guava, sweet potato and flowers, such as marigolds, were grown on chinampas. Variations of floating gardens were also described in China where cultivators made soil-covered rafts, which they tethered to a riverbank, and grew rice on. Another example is the floating gardens in Kashmir, which produce flowers and vegetables.

#### **4. Egypt: Birthplace of Horticulture**

But when did horticulture begin? Some horticultural historians believe that horticulture “began” in Egyptian temple gardens where fruit trees, palms and grape vines were cultivated. Egyptian horticultural advances, however, did not happen in isolation, but were borrowed and refined from the horticultural innovations already found in the Near and Middle East, such as irrigation, one of the most important technologies developed in agriculture and horticulture. For example, although Egypt is credited with introducing the first hydraulic engineering and systemic irrigation, it was probably invented by the Sumerians. The Egyptian system incorporated a network of canals, dikes, sluices, basins, etc.; for example, small irrigation systems in temple gardens were found in illustrations dating from around the 6<sup>th</sup> millennium BCE.

The Egyptians cultivated a wide range of foodstuffs (garlic, onion, radish, lettuce, parsley, different beans and lentils, melons and gourds, dates, figs, grapes and later the pomegranate, olive, apple, peach and pear), and a great variety of herbs, spices and medicinal plants. As well, 200 species of flowering and aromatic plants have been

identified from remains found in the royal tombs.

Archeological evidence also shows that ancient Egyptian gardens contained a number of elements that persist up into modern times. For example, the usual layout of an ancient Egyptian garden was formal, often symmetrical and rectangular, a layout that is still recognized as being the most efficient way to irrigate and providing easy access for weeding and for harvesting plants. As well, the Egyptians built some gardens on different levels that were linked by terraces, incorporated water features into their gardens, and separated their gardens into distinct sections by using walls, lines of trees, pergolas, etc. The ancient Egyptians classified their gardens by their form, what was grown in them and the buildings the gardens were attached to. For example, there is archeological evidence of separate vegetable gardens, olive groves, fruit orchards, vineyards, groves of incense trees and what we would call wood lots, where trees were cut down and used to make objects. From their drawings of ornamental and utilitarian plants growing in pots, we believe the ancient Egyptians also understood container gardening.

The practices of pre-modern horticulture were strongly connected to myth, superstition, folklore and religion. This connection was seen in the early gardens around the world and still persists in some cultures today. Ancient Egyptian gardens certainly were no exception. In their temple gardens, for example, the buildings and plants were symbolic, were regarded as sacred and reflected creation myths and the connection with various gods and goddesses. The gardens provided the flowers, perfumes, vegetables and fruits that were needed in religious rituals as well as to feed the priest and others living in the temple complexes.

## **5. Pre-Columbian Central and South American Horticulture**

The centers of horticultural development found in the Americas have strong horticultural traditions beginning between 8000 and 2000 BCE and documented during the eras of the three great South American civilizations (Aztec, Maya and Inca) and earlier peoples, such as the Olmecs (800 BCE to 600 CE). For example, archaeologists found remains of three irrigation canals dating from the 4<sup>th</sup> millennium BCE, the 3<sup>rd</sup> millennium BCE and the 9<sup>th</sup> century CE in the Zana Valley of the Peruvian Andes. Terracing and irrigation were perfected by the Incas, who grew a large range of vegetables and fruits on them. The Incas were said to be quite successful horticulturists, rather than large-scale agriculturists, who also grew plants used for contraception, medicines, dyes and poison.

As in other emerging societies, gardens in the pre-Columbian Americas were ruled by religious ritual and sacrifice. For example, pre-Columbian Aztec gardens were sacred places, filled with ornamental, aromatic and medicinal plants that symbolized various myths and gods, rather than food plants. Because food crops were supplied to royalty and the upper classes through tribute, their gardens did not have to be subsistence based. In fact, Montezuma, the great Aztec leader, did not allow edible plants in his gardens, saying they were only to be grown in the gardens of the lower classes. Flowers were cultivated because they were very important in Aztec religious rites (they were offered to the gods) and in confirming leadership rights (flowers conferred the strength to lead

and connected leaders to divine powers). Spanish accounts in the 12<sup>th</sup> and 13<sup>th</sup> centuries seem to indicate that the Aztecs also had botanical gardens filled with wild species that were arranged in a botanical system of some sort.

Early Mayan agriculture and horticulture probably focused on corn, root vegetables, such as potatoes, and local fruits. Ancient Mayans used the slash and burn system of cultivation, which is still practiced today by other forest-dwelling peoples. The Mayans are credited with devising the unique multi-cropping practice, which is still used by home gardeners in the western world: These ancient horticulturists planted bean, corn and squash seeds in the same hole. As the corn stock grew up, the bean plant climbed on it to reach the sun and the squash grew along the ground, smothering weed growth. We can also thank the Mayans for spreading the cultivation and use of cacao.

## **6. Greek and Roman Advances**

The rise of Greek civilization by 1600 BCE, and its flourishing during the Hellenic Period (750-450 BCE), benefited horticulture as Greek writings on agriculture and horticulture spread, notably in the Mediterranean region. These writings especially influenced Roman practices during the years of its empire (7<sup>th</sup> century BCE up into the 5<sup>th</sup> century CE) and later influenced medieval herbalists. The Greeks themselves were also influenced by earlier horticultural innovations and concepts, such as the Persian garden model (which may date back to 4000 BCE). The ideas of enclosure and protection – an escape from the world – were introduced through the Persian garden. The Persian word for garden was translated into Greek and then into Latin (*paradises*) and came to mean a paradise on earth. Typical garden components were shade and water – both at a premium in the hot, dry countries of the Middle and Near East.

From the Greeks, the Romans also inherited the knowledge of grafting, budding, legume rotation, and sheltered, enclosed growing. The Romans were practical horticulturists who expanded and tended their country estates, where they installed fruit orchards, flower gardens and landscaped gardens ornamented with statuary, fountains, terracing, etc. By the 2<sup>nd</sup> century BCE, the Romans had refined and improved their horticultural practices and techniques, such as grafting roses and soaking seed before sowing. As well, they began developing specialized tools, such as pruning knives and fruit-picking ladders. The Greeks and Romans also recorded methods to prevent pest and disease damage to their crops by performing sacrifices and applying folk remedies, such as mixtures of various plant extracts, on fruit trees. Roman horticultural practices were to influence the development of horticulture in Europe for centuries. As well, their formal garden designs became the foundations on which Renaissance garden designers built on.

## **7. China and Japan: Horticultural Centers of the Far East**

China and Japan were also centers of horticultural development and innovation, isolated for centuries from the other centers of development, at least until the 10<sup>th</sup> century BCE. (Archaeologists found silk from China in Egypt dating to the 10<sup>th</sup> century BCE.) However, it is certain that new fruits and vegetables were only introduced from central Asia and India into China by the 6<sup>th</sup> century. The Chinese were horticultural innovators,

devising such things as the cast iron hoe, by the 6<sup>th</sup> or 5<sup>th</sup> century BCE and the single-wheel wheelbarrow by the 2<sup>nd</sup> century BCE. They were using heated structures already in the 2<sup>nd</sup> century BCE to grow alliums, and by the 1200s, were building simple greenhouses using oiled paper where they grew flowers and vegetables. Ornamental garden art, also practiced by the 2<sup>nd</sup> century BCE in China, is documented in writings describing elaborate gardens containing artificial hills, complex water features and irregularly shaped rocks – all placed to evoke an idealized scene from nature. Common elements in Chinese, and later in Japanese, formal gardens were pools/lakes, islands, connecting bridges, waterfalls, mounds, trees and stones and rocks.

As in other old civilizations, early ornamental gardens were mainly cultivated by royalty, and later by the wealthy. The visits of Marco Polo in the 1200s as well as the activities of Arab traders helped spread Chinese horticultural technologies and plants, such as spices, to Europe starting in 900, probably along the famous caravan trade route, the Silk Road.

Ornamental garden design in Japan was directly influenced by Chinese models. However, the Japanese garden, appearing later in the 3<sup>rd</sup> century, was more abstract than the Chinese garden at first. However, these simple designs had been transformed between 800 and the late 1100s, into lavish combinations of artificial lakes and hills. Japan's first treatise on the art of gardening appeared in the early 13<sup>th</sup> century. Later, Zen garden design would become synonymous with the Japanese garden for the rest of the world. Heavily influenced by Zen Buddhism, these gardens had a meditative focus: trees, rocks, sand and garden furnishings were combined into an abstract representation of nature. As well in Japan, flower cultivation and arrangement was considered an art and many plants had symbolic meaning; for example, plum blossoms symbolized beauty.

## **8. Middle Ages in Europe up to the 1400s**

After the destruction of the Roman Empire by the end of the 5<sup>th</sup> century, Europe entered the Dark Ages (5<sup>th</sup> to 8<sup>th</sup> centuries), which marked the beginning of the Middle Ages. The great Roman cities were diminished, civil authority had broken down and the focus of power had shifted to the protected rural estates of notables (the precursors of castle fortresses). Traditional agricultural and horticultural practices continued to be practiced on these estates. However, as Islam expanded into the Iberian Peninsula beginning in the early 700s, the newcomers introduced new foods and crops.

As well, these turbulent times witnessed the rise of Christian monasteries, which became plant repositories and places where European horticultural practices were passed on and maintained and many plants were kept in cultivation. Ancient herbal lore thrived in these protected environments. (The protection and knowledgeable cultivation of new and known plants would be assumed later by the botanical garden beginning in the Renaissance and in modern times by the seed bank.) During the Middle Ages, the herbals of the ancient Greeks and Romans were re-discovered and translated. Some monks, who cultivated physic gardens of herbs and spices, became proficient in applying herbal lore to treat disease and physical ailments. This lore was passed down from generation to generation in religious institutions as well as through individuals

(often women), and became the foundation of modern medicine.

Essential tools continued to be refined. Bone, wood and stone tools probably continued to be used in many parts of the world. However, once iron was discovered in Europe, the strength and design of tools improved. The Romans certainly had devised a number of iron-clad and metal-headed tools, such as the precursor of the pickaxe and the broad spade. With the inventing of the blast furnace during the Middle Ages, iron could be melted and cast into tools. Before this, all iron was wrought. For example, it is believed that in the 6<sup>th</sup> century, the Slavs, in what is now Poland, introduced the moldboard plow. This plow, pulled by an oxen team, could cut deeper into heavy soil. This innovation allowed more land, previously thought to be uncultivable, to be opened.

Between the 11<sup>th</sup> century and the end of the 13<sup>th</sup> century, Europe emerged out of these dark times – cities began to grow, agriculture and horticulture expanded and learning and knowledge was revived. As well, as civil unrest settled down and towns and cities began a sustained development and as economic activity increased in Europe, the beginnings of capitalism based on a money economy began.

Horticultural crops (herbs, vegetables and fruit, as well as flowers for church decoration) began to be sold as goods, rather than bartered. By the 1200s, beginning in Italy, the feudal organization of society and government was giving way to city republics that were based on merchants and commerce. These city republics, Venice was one of the most important, were instrumental in expanding trade with the East, with its spice riches.

Another major development in the Middle Ages was the formal recognition of horticulture as distinct from agriculture. This recognition evolved from the increasing importance of the kitchen garden (supplying vegetables, herbs and fruit), which, based on earlier Roman estate organization, was located next to the manor house with the agricultural fields further away from the house. Agriculture was now seen as divided into agronomy, horticulture and forestry. Tools began to be specialized to suit different horticultural operations. However, in other areas of the world, no clear separation between agronomy and horticulture was noted and tools continued to be made from wood for a longer period.

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### Biographical Sketch

**Edwinna von Baeyer** is a landscape historian who has been writing books and articles on Canadian landscape history for nearly 30 years. Her first book, *Rhetoric and Roses: A History of Canadian Gardening, 1900-1930*, was the first full-length study of the social history of gardening in Canada before 1930. Her latest book is *Down the Garden Path: A Guide for Researching the History of a Garden or Landscape*. Ms. von Baeyer lives in Ottawa, Canada, where she also runs a company specializing in writing, editing and research for a wide range of clients on an equally wide range of subjects.