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# Plant Iconography and Art: Source of Information on Horticultural Technology

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**Abstract.** Works of art from prehistory to the present constitute an alternate source of information on horticultural crops. Plant iconography becomes a valuable resource for investigations horticultural technological practices; crop history including evolution under domestication, crop dispersal, lost and new traits; and genetic and taxonomic information. Crop images are also one of the unequivocal tools for assessing the historical presence of botanical taxa in a particular region and are an especially valuable resource for determining morphological changes of crops from antiquity to the present. Early written descriptions are often ambiguous and the confusion of plant names in ancient documents makes the image essential to determine the precise species involved plus providing information on the presence of morphological characters that may be unclear from the text. A plethora of ancient plant images exists, but they are widely scattered among libraries and museums, and are often difficult to locate and to access. However, the digitization of information by some of the major world libraries has greatly facilitated the search for ancient illustrations, although they still remain expensive to publish.

**Keywords:** agriculture, history, horticulture, plant image

## INTRODUCTION

The technology and science of horticulture represents a wealth of information that is passed on from generation to generation in a number of ways. The classic approach is the oral tradition where information is passed from parent to child, artisan to apprentice, and professor to student. The creation of writing has created the literary approach where information is preserved in writing - impressed in clay, chiseled on tablets, carved in stone, and printed on paper, and archived in libraries in the form of scrolls, books, film, and now preserved in electronic form. In the age of science new information in written form because the grist for the mill of scientific journals and monographs. However, there is a third form of information based on artistic representation as a consequence of the basic human impulse to create images. The artistic tradition developed around drawing, painting, and sculpture and has left an alternate record that is part of our heritage that stretches from Paleolithic times to the present. The visual arts have been valued because they constitute both an esthetic and illustrative means of transmitting information. The esthetic appeal of art is its ability to transmit an emotional response from the artist to the viewer, because the visual sense is so highly developed in humans. However, illustrative art also transmit various other types of information, much of it of value to historians and to science. It is no accident that writing developed from pictures and indeed we are returning to this method of transmitting information though the use of icons in signs and in computers. While the esthetic approach to art has been moving force in its evaluation by art historians, the artistic record also can be used to examine technological information. There are numerous sources of plant iconography

including cave paintings, ancient mosaics, sculpture, carvings and inlays, frescos, tapestries, illustrated manuscripts, printed herbals, books, and photographs (Janick, 2007; Janick *et al.*, 2011). This paper will survey briefly the use of the artistic record to transmit and convey information on agricultural and horticultural science and technology from prehistory to the Renaissance and beyond.

## HISTORICAL ERA

### The Paleolithic Record

The Paleolithic period (Old Stone Age) extends from 750,000 to 15,000 years ago when humans were hunters and gatherers. Their culture survived chiefly though the remains of stone tools, whose features along with carbon dating can be used to determine chronology. About 500, 000 years a surge of hominid expansion occurred from populations that had a brain capacity of 1100–1300 cc, a species now know as archaic *Homo sapiens*. This group gave rise to Neandertals, brawny large brained tool-making humans that appeared in Europe about 250,000 years ago but destined to be overtaken by an African group via Asia, *Homo sapiens* or Cro-Magnon, the human species that is us. About 200,000 years BP these two groups coexisted but Neandertals disappeared about 25,000–30,000 years BP. The artistic legacy in the form of sculpture and cave paintings of this new group in the form of realistic images of humans and emphasizing the hunt represent the beginning of art history. The images were mostly animals but include plants (Fig. 1). Some sculptures of voluptuous women (Fig. 2) known as Venuses, still present an emotional impact related to the keen interest of early humans in fertility, and evidence of clothing probably made from plant sources indicating the development of weaving and textile technology (Fig. 2).

The discovery of Agriculture about 10,000 to 12,000 years ago occurred in a relatively short period of time in the Neolithic (New Stone Age) period and this "sudden" transformation in culture is referred to as the Neolithic Revolution. The technology associated with the domestication of plants and development of agriculture can be traced before the discovery of writing in about 3000 BCE, in artistic imagery of the Neolithic. Individual crop species can be identified (Fig. 3) along with stunning images of women gathering grain in an organized pattern, 5000 to 6000 years ago (Fig. 4).

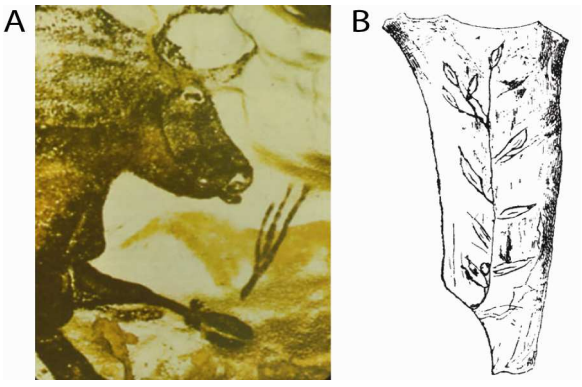


Fig. 1. Paleolithic images of plants:
(A) aurock with a primitive image of a plant;
(B) plant stems and leaves carved on reindeer horn.
Source: Tyldesley and Bahn, 1983

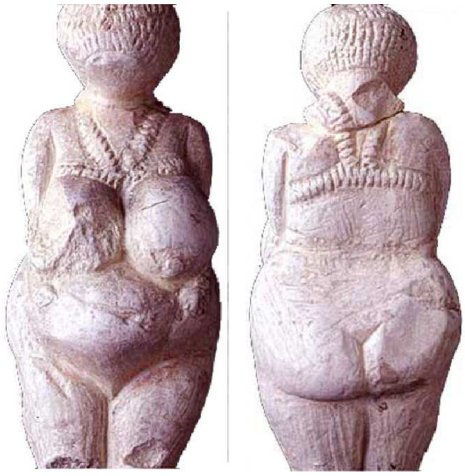

Fig. 2. Woman figurine of the Paleolithic period showing evidence of textile technology.
Source: Janick, 2007

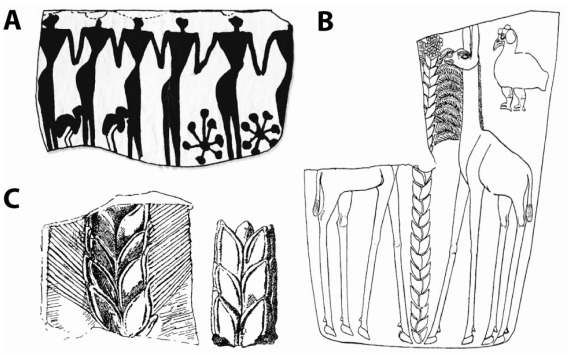


Fig. 3. Early Neolithic and Bronze age representations of crops where plants can be identified: (A) pottery image from Tejpe Sialk, Iran, 7000 years bp showing dancing figures, birds, and plants, perhaps wheat or barley; (B) predynastic Egyptian image of drawing of palm tree and gazelle 5000-6000 BP; (C) cereal carving, first dynasty, 5000 years bp

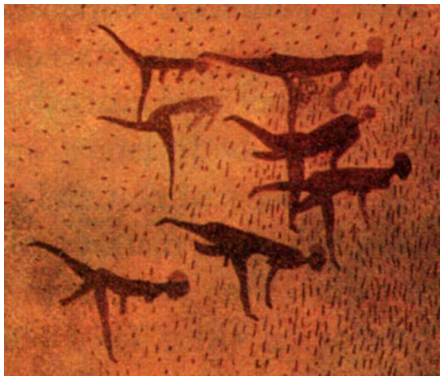

Fig. 4. Women gathering grain, Tassilil n'Ajjer, Algeria

## Mesopotamia

The ancient Near East cultures known as Mesopotamian civilization are largely based on Semitic populations that existed between the Tigris and Euphrates river now present day Iraq that soon expanded to the area known as the Fertile Crescent including parts of present day Israel, Jordan, Lebanon, Syria, Iraq, and Iran.

A second Neolithic Revolution between 6000 and 3000 BCE (Bronze Age) involves the change from villages to urban centers and the development of a settled agriculture coinciding with the beginning of fruit culture. This is well documented in the decorations of a 4$^{th}$ millennium BCE urn (Fig. 5); found in Uryuk (Erech), a town on the Euphrates north of Basra, Iraq that is associated with Sumerian civilizations, where writing was invented. Other evidence of horticultural technology include the refinement of a plow with a seed drill (Fig. 6), date palm pollination (Fig. 7), and irrigation technology (Fig. 8). The drawings of trees vary from primitive, to naturalistic, to symbolic (Fig. 9).

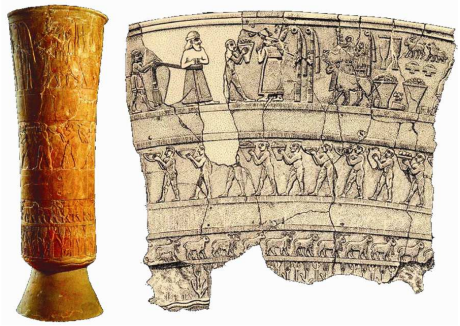

Fig. 5. The Uryuk vase, late 4$^{th}$ millennium BCE, showing attendants bearing fruit. Note the progression from water at the bottom, domesticated barley and sesame, domestic sheep; to attendants bearing fruit in a wedding ceremony, probably between a priest king and the goddess Innana (Istar). Source: Pollock, 1999

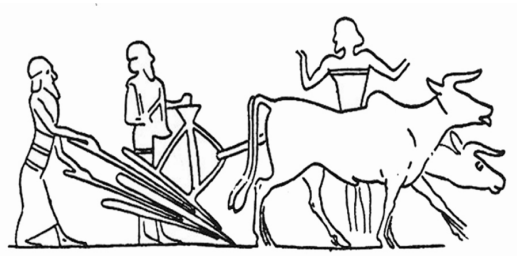

Fig. 6. A Babylonian scratch plow with seed drill from a Cassite cylinder-seal, 2$^{nd}$millennium BCE. Source: Singer *et al.* 1954

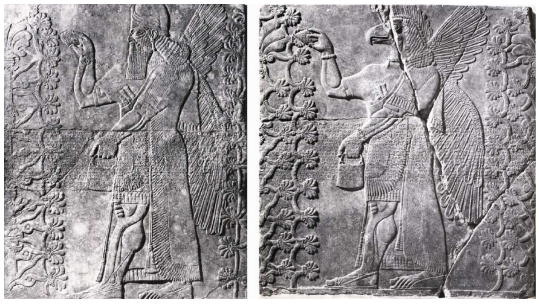

Fig. 7. Date palm pollination depicted in Assyrian bar-reliefs, 883–859 BCE. The pollinator assumes the form of a god-like figure (genie or jinn) and the date palm has been transformed into a symbolic tree. Source: Paley, 1976

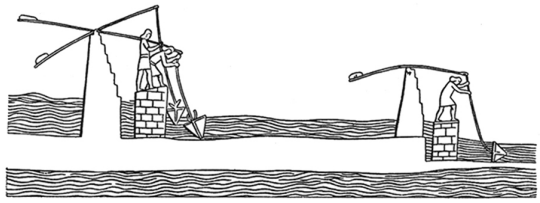

Fig. 8. Raising water by three Assyrians operating a double lift from the river with shaduf. From the palace of Sennacherib at Nineveh, Mesopotamia 7th century BCE. Source: Singer *et al.*, 1954

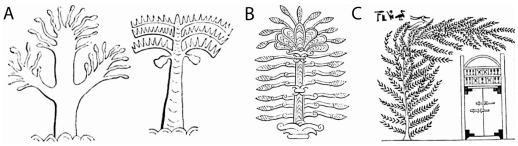


Fig. 9. Pictorial representations of trees: (A, B) primitive drawings from Assyria; (C) sacred tamarask from tomb of Osiris in Egypt. Source: Gothein, 1966; Singer, 1954

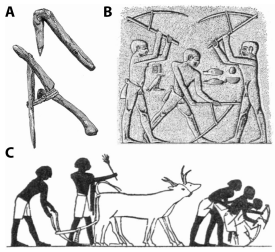


Fig. 10. Cultivation technology form ancient Egypt: (A, B) development of the hoe and hefted hoe; (C) development of the plow with animal traction. Source Singer *et al.*, 1954

## Egyptian Art and the Origins of Horticulture

Egyptian civilization dates back to the dawn of civilization and artifacts exist in a continuous 6000 year-old record. The artistic genius engendered by Egyptian civilization, the superb conditions of many burial chambers, and the dry climate have made it possible to reconstruct a detailed history of Egyptian agriculture (Janick, 2000). Ancient Egypt is shown to be the source of much of the agricultural technology of the Western world. The available material is overwhelming and a brief sampling of the artistic record connected with horticultural technology is provided including cultivation (Fig. 10), irrigation technology (Fig. 11), harvest and pest control (Fig. 12), wine production, the beginning of biotechnology (Fig. 13), and ornamental horticulture (Fig. 14).

Knowledge of crops of ancient Egypt can be deduced from the artistic record and definite proof comes from the desiccated remains of plants themselves, many of which can be viewed in the ancient Egyptian Agricultural Museum in Cairo. The chief grains used for bread and beer were barley and various wheats including the diploid einkorn (AA genome), the tetraploid emmer and durum wheats (AABB), and the hexaploid spelt and bread wheats (AABBDD). The vegetable crops included allium such as garlic and onion, radish, leafy salad crops such as lettuce and parsley, and pulses such as chickpea, cowpea, faba bean, and lentils, and cucurbits such as bottle gourds, melons, and watermelon. Fruit crops included various carob, fig, grape, jujube, pomegranate, and later in the Graeco-Roman era, apple, peach, and olive. Almost 2000 species of flowering and aromatic plants are recorded. An exquisite relief found on the walls of the Philae Temple at Aswan, Egypt depicts a visual representation of the fragrance of essential oils being extracted from an herb (Fig. 15). Herb and spice plants important for culinary, cosmetic, medicinal, and religious uses including embalming were

continually introduced. In the15th century BCE, Queen Hatshepsut sponsored an expedition to Punt in east Africa to fetch myrrh and spices (Fig. 16).

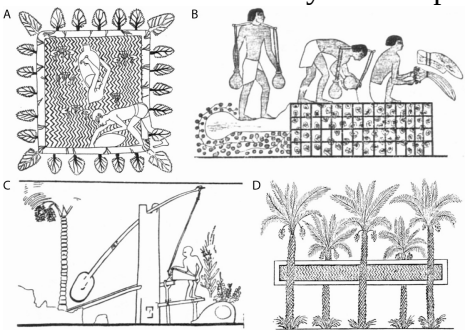


Fig. 11. Irrigation technology from ancient Egypt Source: (A) lifting water with an amphora from a pond; (B) irrigating a garden with gourds attached to a yoke; (C) a water device called the shaduf, (D) an irrigation pond between date palms. Source: Singer *et al.*, 1954

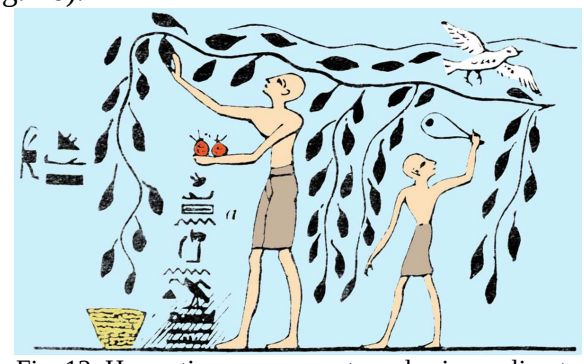

Fig. 12. Harvesting pomegranate and using a sling to chase birds in ancient Egypt.
Source: Singer, *et al.*, 1954

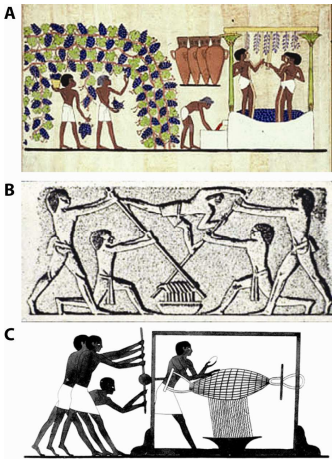


Fig. 13. Wine production in ancient Egypt: (A) grape production under a pergola; (A) expressing juice by foot with fermentation in amphorae; (B) expressing wine from a bag press; (C) a bagpress with a rotary apparatus. Source: Singer *et al.*, 1954

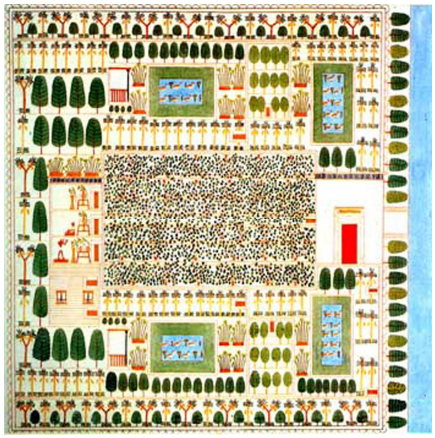

Fig. 14. Ornamental horticulture is typified in a garden plan for a wealthy Egyptian estate with two types of palms (single trunk = date palm, bifurcated trunk = doum palm).
Source: Berrall, 1966

Fig. 15. Visual representation of the fragrance from essential oils emanating from a herb at the Philae Temple (dismantled and reassembled on Agilika Island, about 600 m from Its original location), Aswan. Source: J. Janick, photo

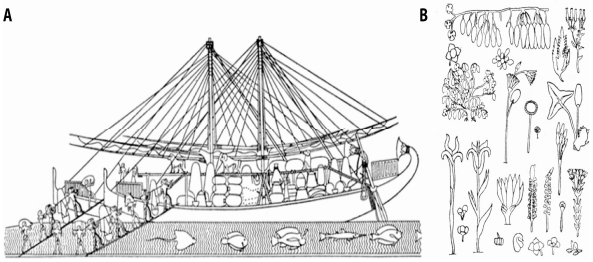


Fig 16. Egyptian plant exploration: (A) Queen Hatshepsut's fleet landing at Punt (northeastern coast of Africa) with exotic merchandise bound for Egypt. From a temple at Deir el-Bahri, 18th Dynasty, Egypt, ca. 1500 BCE. Note the tame baboons, the marine life, and the transfer of incense (myrrh) plants; (B) strange plants and seeds brought back from Syria and carved on the walls of the temple of Karnak, ca 1450 BCE. Source: Singer *et al.*, 1954

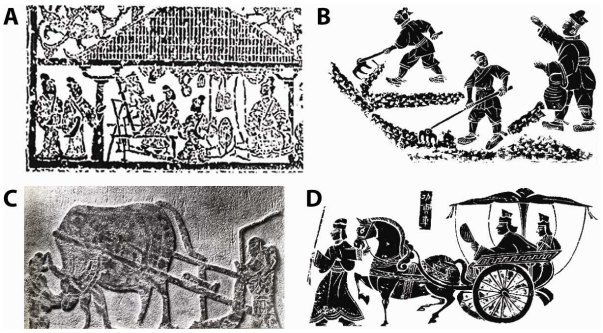


Fig. 17. Ancient Chinese technology depicted in the Han dynasty, 206 BCE–220 CE): (A) silk industry; (B) hoeing plants in rows with iron tools; (C) plowing with water buffalo; (D) horse cart with trace harness

Fig. 18. The peach above the head of the legendary Zhong Kui signifies long life. Source: Faust and Timon, 1995

## Asian World

The beginnings of agriculture in eastern Asia date to Neolithic times slightly later that the Near East (Janick, 2003). By 2000 BCE advanced civilizations are found in North China and Manchuria with evidence of canals and extensive irrigation. The writings of Confusion mention 44 food plants including horticultural crops such as chestnut, Japanese apricot, jujube, mulberry, peach, plum, quince, Chinese cabbage, bottle gourds and various melons. First century agricultural manuals describe intensive production of crops, pretreatment of seed, irrigated rice, ridge cultivation, pot culture, pretreatment of seed, composting, and iron tools. Ornamental culture becomes embedded in the culture of China and spread throughout Asia. Flower cultivation became one of the seven arts and assumed mystic importance. Exchange of technology with the West involved sea routes via India and the Mideast as well as overland routes known as the Silk Road. Evidence of ancient technology is depicted in art of the Han dynasty (Fig. 17)**.** The peach which originates in China (Fig. 18) reached the West in Roman times via the Silk Road and its name *Prunus persica*, reflects the mistaken belief mistakenly that it originated in Persia where it passed through.

## Greek and Roman Civilization

The rise of Greek culture from 2000 BCE was to extend throughout the Mediterranean Basin at its peak from (750 to 450 BCE) and had a profound influence on Western Civilization. Greek Culture, (Hellenism), associated with the flourishing of the arts and sciences was based on the domination of ideas rather than technology perse, and had a powerful influence on Roman culture that superseded it by force of arms. Although Greek culture is remembered by its philosophers/scientists, its agriculture is passed down to us via art in the form of paintings on ceramics (Fig. 19). Roman horticulture survives in a rich written tradition and naturalistic images appear in paintings (Fig. 20) and mosaics (Fig. 21). Techniques of Roman pomology are shown in mosaics illustrating grafting, manuring, harvesting, and juice extraction (Fig. 22).

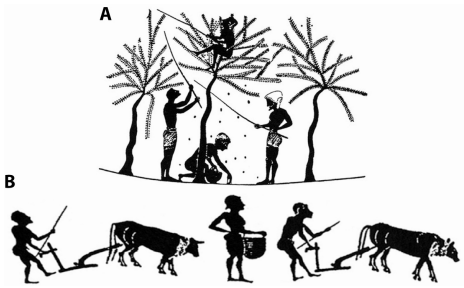


Fig. 19. Greek horticultural technology: (A) harvesting olives; (B) Greek plow. Source: Singer, 1954

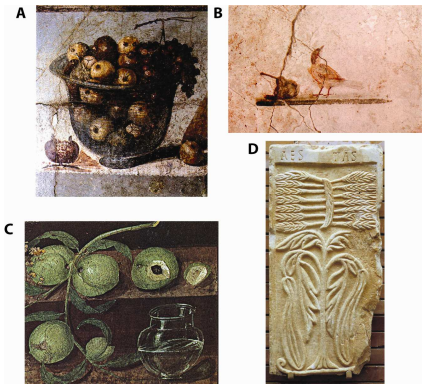


Fig. 20. Roman fruit paintings from Pompeii and sculpture: (A) glass bowl with many temperate fruits; (B) pear; (C) green freestone peach; (D) bar relief of melon (*Cucumis melo* var. *flexuosis*) from Merida, Spain, 4th century CE. Source: Jashemski 1979. Source: Jashemski, 1979; Álvarez Martínez *et al.*, 2000

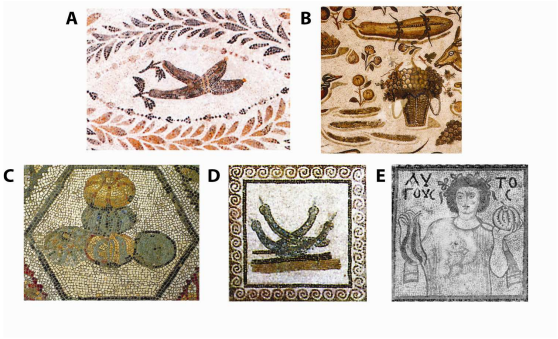


Fig. 21. Cucurbits in Roman mosaics; (A) long fruited melon (*Cucumis melo*, Flexuosis Group) with small yellow-orange corollas clinging to the acute stylar end from Tunisia, 2nd century; (B) immature and mature long fruited melons showing fruit splitting. Tunisia 3rd century; (C) round fruited melon *Cucumis melo* showing striping, Tunisa, 4th century; (D) bottle gourd (*Lagenaria siceraria*) showing characteristic swelling on the pedunular end; (E) youth holding bottle gourd in right hand and watermelon (*Citrullus lanatus*) in left hand in mosaic titled August, Tegea Episkopi, late 4th to 5th century Peloponnese. Source: Janick *et al.*, 2007a

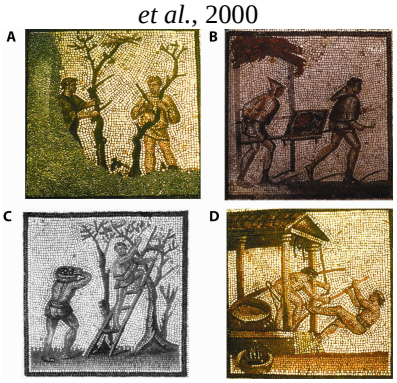


Fig. 22. Roman pomology from 3rd century CE mosaic, St. Roman-en-gal, Vienne, France: (A) detached scion grafting; (B) manuring; (C) fruit harvest; (D) juice extraction. Source: Janick, 2007

## PreColumbian Americas

The three great cultures in America at the time of Columbus' encounter with the New World, Aztec, Maya, and Inca, were monumental civilizations, similar in many ways to that of ancient Egypt of 2000 BCE, with enormous temples in the form of pyramids, pictorial writing, a system of cities and government, a developed agriculture, a bewildering theology, and a magnificent art. There was a dark side involving slavery, constant warfare, the human sacrifice, and cannibalism. The rich art of these civilizations includes information on the domestication of indigenous crops as portrayed in ceramics (Fig. 23), the development of land reclamation (Fig. 24), and detailed description of crop culture such as potato and maize (Fig. 25).

The gold and silver objects of the New World sought and claimed by the conquistadores were melted down to enrich Iberia in the short run, but they were used to finance European wars, which ultimately led to Spain's decline. However, much more valuable than gold and silver treasures were the new crops from the New World which have continually enriched the bounty and cuisine of Europe and the world. Important New World crops include maize (*Zea mays*), tomato (*Solanum lyocopersum*), pepino (*Solanum muricatum*), husk tomato (*Physalis* spp.), chili peppers (*Capsicum* spp.), potato (*Solanum tuberosum*), cassava (*Manihot utilissima*), common bean (*Phaseolus vulgaris*), lima bean (*Phaseolus lunatus*), peanut (*Arachis hypogaea*), squashes and pumpkins, (*Cucurbita* spp.), chayote (*Sechium edule*), cacao (*Theobroma cacao*), avocado (*Persea americana*), guava (*Psidium guajava*), papaya (*Carica papaya*), passion fruit (*Passiflora edulis*), pineapple (*Ananas comosus*), Brazil nut (*Bertholletia excelsa*), cashew (*Anacardium occidentale*), cactus pear (*Opuntia ficus-indica*), pitaya (*Cereus*, *Hylocereus*, and *Stenocereus* spp.), American cotton (*Gossypium hirsutum*), rubber tree (*Hevea brasiliensis*), tobacco (*Nicotiana* spp.), and sunflower (*Helianthus annuus*). Many of these crops can be found in the iconography of the indigenous peoples of the New World and were soon to appear in Renaissance European art (Fig. 26).


Fig. 23. Pre-Columbian ceramic jars from Peru: (A) peanut; (B) potato; (C) squash; (D) cacao pod. Source: Leonard, 1973

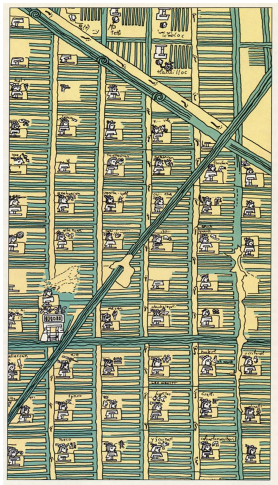

Fig. 24. Land reclamation in Aztec culture. A plan of a small portion of the gigantic chinampa system of island culture ("floating gardens"). Source: Leonard, 1973

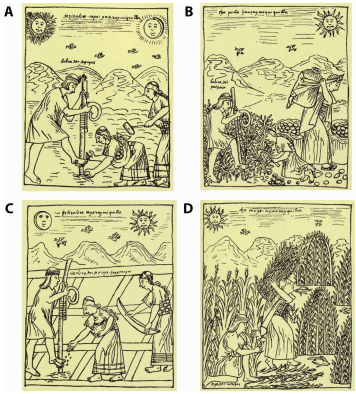


Fig. 25. Planting and harvest of potato (A, B) and maize (C, D) by the Incas, 1580. Source: Leonard, 1973

Fig. 26. An Indian garden showing beans, capsicum peppers, cucurbits, maize, papaya, and pineapple. Source: *Histoire naturelle des Indes*: The Drake Manuscript in the Pierpont Morgan Library (1586)

## Late Antiquity

The *Juliana Anicia Codex (JAC*) or *Codex Vindobonensis*, 512 CE, is a magnificent, illustrated = manuscript from late antiquity found in Constantinople and based on the famous herbal *Peri Ylis Iatrikis* (Latinized as *De Materia Medica*, *On Medical Matters*) originally written about 65 CE by the Roman army physician Pedanius Dioscorides (20–70 CE) born in Anazarbus, Cilicia in what is now southeastern Turkey. The manuscript, made for the daughter of the Roman emperor Anicius Olybrius, contains descriptions, medical uses, and illustrations of almost 400 plants listed alphabetically and can now be accessed though a two-volume facsimile edition, *Der Wiener Dioskurides* (1998, 1999). There is an English translation by Beck (2005) of the reconstructed original non-alphabetic Dioscoridean manuscript in German by Wellman (1906–1914). Examples of crop information from the *JAC* (Fig. 27) include cowpea (*Vigna unguiculata*) showing indeterminate plant growth, an interesting genetic variant in this species. The illustration of two brassicas show the non-heading trait in cabbage and rather typical morphology of turnip. Finally an elegant depiction of blackberry shows primocane fruiting and rooting of shoots but there are botanical inaccuracies in leaf morphology and petal number (Hummer and Janick, 2007). A similar drawing in a later recension (cca. 675) of Dioscorides called *Codex Neapolitanus*, although not as fine as that of the *JAC*, is botanically more accurate in reference to leaf and petal morphology, indicating that both drawings derive from a lost template.

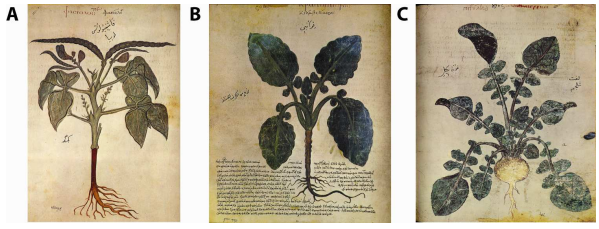


Fig. 27. Crop illustrations from the *Juliana Anicia Codex* of 512 CE: (A) cowpea (*Vicia unguiculata*) showing indeterminate growth habit; (B) non-heading cabbage (*Brassica oleracea*); (C) turnip (*Brassica rapa*). Source: Der Wiener Dioskurides, 1998, 1999

Fig. 28. Stylized portrait of *Rubus* in *Leech Book of Bald*, ca 920. Source: Hummer and Janick, 2007

## Dark Ages and Medieval Period

The breakdown of the Roman Empire resulted in social disturbances, destruction of the large cities, and a general decline in culture, a period often referred to as the Dark Ages. This is evidenced in the deterioration in the accuracy and content of plant illustrations (Fig. 28). Scribes continued to reproduce and embellish previous manuscripts, rather than observing and representing the existing native plants, and a dogmatic scholasticism that stifled original investigation. However, rural areas and organizations, especially the Roman Catholic and Orthodox Church were left relatively intact, and prospered. A feudal society developed which involved relation between land and the people who owned it and worked it. Feudal society became organized by mutual exchange of protection and services between the land owning class and serfs and society became stratified through nobility (hereditary land owners), a warrior class (knights), serfs and slaves, and the Church which became increasingly powerful and wealthy. Agriculture originally the principal source of wealth, but an increase in economic activity and urbanization, led to the development of a rising

mercantile class including guild workers, tradesmen, and bankers. The rise of manufacturing eventually supplemented and then displaced the feudal system where real wealth moved from the ownership of land to trade and manufacturing.

A late medieval example of crop illustrations can be found in a series of lavish versions of manuscripts known as the *Tacuinum Sanitatis* (*Tables of Health*), which were prepared as royal gifts. There are six major works (one is divided) in libraries in Liège, Vienna, Rome, Paris, and Rouen, which were commissioned by northern Italian nobility, initiated during the last decade of the 14th century (Paris *et al.*, 2009; Daunay *et al.*, 2009; Janick *et al.*, 2009). The text is based on an 11th-century Arabic manuscript, *Taqwim al-Sihha bi al-Ashab al-Sitta* (*Rectifying Health by Six Causes*), written as a guide for healthy living by the Nestorian Christian Arab physician known as Ibn Butlan (d. 1063). Vivid agricultural imagery includes scenes of the harvest of vegetables, fruits, flowers, grains, and culinary and medicinal herbs, accompanied by a brief summary of the health aspects of the subject. Each of the manuscripts are drawn by different artists but are obviously related. The *Vienna codex Ser. N. 2644* contains the most accurate depictions, which include 9 cereals, 26 vegetables, 33 fruits, 3 flowers, and 21 culinary and medicinal herbs. The illustrations show crops at the optimal state of maturity and, moreover, are a rich source of information on life in the feudal society, with nobles engaged in play and romance while laborers work on the estate. A selection of crops from two versions of *Tacuinum Sanitatis* is presented in Fig. 29.

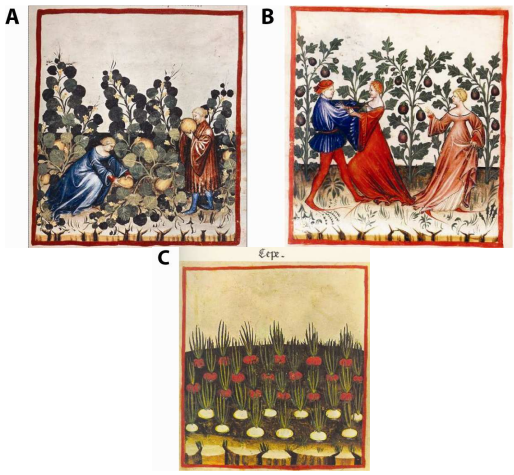


Fig. 29. Crops of the *Tacuinum Sanitatis*, late 14th century. (A) melon (*Cucumis melo* subsp. *melo*) with golden large round fruit that are obviously aromatic as one is being sniffed by the courtier in the red gown, *Vienna 2644*; (B) aubergine / eggplant (*Solanum melongena*) with developing globose, purple fruit borne near plant apices is shown behind a fondling couple being admonished by a lady, implying that eggplant has aphrodisiacal properties, *Vienna 2644*; (C) Onion (*Allium cepa*) showing red and white bulbs, *Roma 4182*. Source: Paris *et al.*, 2009; Daunay *et al.*, 2009

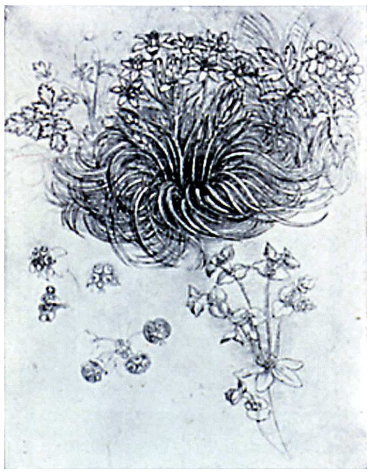

Fig. 30. Star of Bethlehem (*Ornithogalum umbellatum*) by Leonardo de Vinci is one of the finest images of a plant, created when the artist was interested in the dynamics of fluid mechanics

## The Renaissance and the Modern World

The rise of agricultural and horticultural technology is evident in artwork as artists used everyday scenes to ornament their psalters, religious paintings, and portraits. The church became the reservoir of horticultural information which was preserved in hand illuminated manuscripts.


Fig. 31. Cucurbits of the *Les Grandes Heures d'Anne de Bretagne*, 1503–1508: (A) Quegourdes de Turquie (*Cucurbita pepo*), the first image of this species in Europe; (B) Quegourdes (*Lagenaria siceraria*); (C) Concombres (*Cucumis sativus*). Source Paris *et al.*, 2006


Fig. 32. Images of maize by Giovanni da Udina in the ceiling of the Loggia of Cupid and Psyche in the Villa Farnesina, Rome, the first images of maize in Europe: (A) long ears; (B) middle sized ears; (C) short ears. Source: Janick and Caneva, 2005


Fig. 33. The tomato, painted by A Meyer (1549–1556) for an unpublished manuscript by Leonhart Fuchs. Source: Daunay *et al.*, 2008


Fig. 34. Baroque market scenes: (A) *Produce Seller* (1567) by Pieter Aertsen and (B) *The Fruit Seller* (1580) by Vincenzo Campi

Fig. 35. Caravaggio's painting entitled *Still life of a Basket of Fruit* (1601) shows various disease symptoms including anthracnose on a fig leaf, scab on a quince leaf, codling moth injury in a apple, Oriental fruit moth damage on a peach leaf, leaf roller damage on a pear, grape mummies, and grasshopper injury on grape leaves. Source: Janick, 2004a

Fig. 36. Scanning electron photograph of the surface of a tomato leaf

The rebirth of culture that first developed in the 14th century Italy and spread throughout Europe is referred to as the Renaissance. This period in Western civilization is typified by the flourishing of artistic and scientific activities brought about by the new translations of classical philosophers, the rise of humanism, new methods of inquiry involving science, the explosion of knowledge brought about by the emerging universities, the invention of printing, and the extraordinary discoveries associated with the Age of Exploration. In the botanical sciences, this led to a return to nature with inspiration from the real world rather than mere scholasticism, based on endless copying from the past. As in many fields this new spirit of inquiry is crystallized in the detailed and magnificent art of the Renaissance. Examples involving plants include the drawings of Leonardo da Vinci (Fig. 30), the illustrations of Jean Bourdichon (Fig. 31), the frescoes of Giovanni da Udina (Fig. 32), and the woodcuts and paintings made for the herbals of Leonhard Fuchs (Fig. 33). The explosion of art has left a rich legacy that remains a powerful force in Western civilization. The new plants discovered in the Age of Exploration increased the popularity of printed herbals and florilegia that were highly prized and coveted to become the glory of Baroque horticulture. Fruit and vegetable markets became a common theme of artists (Fig. 34). A new art form "*natures morte*" or still life, encouraged by the artist Michelangelo Merisi, known as Caravaggio (Janick, 2004), was to fuse and coalesce the science of botany, the spirit of horticulture, and the realm of art (Fig. 35). This spirit also remains in landscape architecture and garden art.

The modern world typified by the rise of science and the rise of technology has brought new ways to visualize plants both seen and unseen. These including photography, scanning microscopy (Fig. 36), electron microscopy, satellite imaging, and computer modeling.

## CONCLUSIONS

The collection of images of individual crops combines the field of art, history, crop evolution and genetic diversity. The rich connection between art and horticultural technology suggests that the systematic collection of plant iconography would be an invaluable resource to researchers, providing significant information on taxonomy, crop history and evolution, lost traits, and genetic diversity. Unfortunately, the source of many of these works and in particular those from the East, particularly China and India are difficult to access for most Western researchers. Thus, the student of plant iconography is urged seek a wide collaboration with scientists in various locations to assist in the quest. Clearly what is needed are databases of plant images of cultivated plants, a cooperative venture between historians, artists, and crop researchers. To this end a project "Plant Image," is being organized to assemble a searchable database of plant images beginning with the *Solanaceae* and *Cucurbitaceae* (Janick *et al.*, 2006; 2007b). Searches have been made from various sources including art (mosaics, paintings, and sculpture), illustrated manuscripts, and hand illustrated and printed herbals and books. We are concentrating our search on antiquity (Old and New World), Medieval, and Renaissance sources but we intend to include more recent images as well. Bibliographic information on primary and secondary sources needs to be associated with each image. The working database is online: www.hort.purdue.edu/newcrop/iconography.

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