Asian Crops in Renaissance Europe as a Result of the Discoveries: Bypassing the Silk Road

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Abstract

The Eurasian region is a massive land continuum where trading, migration, and conquest have occurred since antiquity. Of the eight Vavilovian Centers of Origin of cultivated plants, five derive from isolated regions in the Eurasian continuum; the sixth is from Abyssinia, and the remaining two from the Americas. The Old World crops were largely known within the region at the dawn of the Modern Age. Asian spices and other crops played a central role in the economical, political, cultural, and scientific changes that occurred in Europe during the 16th and 17th centuries. Vasco da Gama’s voyage around Africa to reach India in 1498, opening a new route between Europe and Asia, epitomizes the rupture with the ancient way of commerce and world view. Crop movement between Europe, Asia, Africa, and the Americas intensified and a new way of looking at plants emerged. Garcia da Orta, the first western botanist in India, described Asian crops in his “Colloquia on the Simples and Drugs of India” (1563) with a previously unknown objectivity. This modern approach to reality has been beautifully captured in the verses by the Portuguese poet Camoes used as an epigraph in Orta’s book “Favor the ancient / Science which Achilles held in esteem;/ Look because you must see / What was revealed in our time / The fruit of a Orta [garden, a pun on Orta’s name] where / New plants bloom, unknown to scholars.” Orta’s book, written in vernacular Portuguese, was translated into Latin by Charles de l'Écluse and became an influential botanical treatise in Renaissance Europe. Scholars would in fact have to revise their knowledge of plants leading to the emancipation of botany and its emergence as a scientific discipline. The world’s economy, science, and literature would not be the same after Gama sailed around the Cape of Good Hope. Spices and other Asian crops were at the center of the story.

INTRODUCTION

The Portuguese and Spanish Discoveries of the 15th and 16th had a profound impact on the subsequent course of world history. One of the outcomes of these voyages was the rapid and extensive diffusion of crops across geographical barriers around the world. In fact, dispersal of crops greatly accelerated in the 15th century (Grigg, 1974). This diffusion of crops was intertwined with the economical, political, cultural, and scientific changes that took place during that period.

A large number of crops are of Asian origin. Five of the eight Vavilovian Centers of Origin of cultivated plants are located in isolated regions within the Eurasian land continuum. In contrast with crops from American origin that were revealed to the rest of
the world after the European arrival in the continent, Asian crops were largely known within the region at the dawn of the Modern Age. Nonetheless, Asian spices and other crops played a central role in the changes that occurred in Europe and the World after the Portuguese Vasco da Gama sailed around the Cape of Good Hope to reach India in 1498. During the century-long explorations that preceded the first maritime voyage to India, crops of Asian origin already grown in the Mediterranean were also present in the adventure.

This essay addresses the contribution of the Portuguese Discoveries voyages in the Indic Ocean to the changes of cultural and economic paradigms, with emphasis on the knowledge and diffusion of crops. The focus will be on crops of Asian origin and their descriptions and movements during the 16th and early 17th centuries, in the context of the cultural transition that occurred in Renaissance Europe. The decades of the 15th century that lead to the discovery of the Cape route are considered as context. Occasional mentions of African and Brazilian crops are made in relation to the Asian crops diffused by the Portuguese.

POLITICAL HISTORY BACKGRAUND

The Eurasian Geographic Continuum

Movement of humans and goods within Eurasia has occurred since antiquity motivated by trading, migration, and conquest. Some landmark events retained by the annals of world history illustrate the span of these movements. Alexander the Great (356–323 BCE) departed from Macedonia and established an Empire that spread from Greece to the Indus River, though Anatolia, Babylon, and Persia. Medieval crusades took Central and Western Europeans to the Middle East, where contact with Asian crops was facilitated and interest in spices stimulated. The Venetian merchant Marco Polo (1254–1324) departed from his home town in 1271 and travelled to China where he remained for 17 years before returning to Venice. His accounts of Asian spices and other treasures spurred the imagination of literate Europeans.

In medieval times a network of trading routes was established between Europe and the Far East, connecting Mediterranean Europe (Italian Republics), Arabia, Persia, India, and China. This network of trading routes became known as the Silk Road and assured trade between Asia and Europe until the end of the 15th century.

Bypassing the Silk Road

The Portuguese exploration program started with the conquest of Ceuta, Morocco, in 1415. Prince Henry the Navigator (1394–1460), who was part of the expedition to Ceuta lead by his father, king John I, would become in subsequent years the mind behind the Portuguese plan to systematically explore the African Coast. The Madeira Islands were colonized in 1420, the Azores in 1427, and Gil Eanes sailed beyond Cape Bojador in 1434. Sailing south of the Bojador (lat. 26°N) was no small task: more than the need to navigate far from land to avoid the shallow waters and strong currents, the Bojador was a psychological barrier for the medieval sailors. The Ocean was a fearful entity for the terrestrial Europeans of the late Middle Ages (Mattoso, 1998). The Portuguese Poet Pessoa has captured the groundbreaking event in his verse: “Whoever wants to go beyond the Bojador/Must go beyond pain.” Exploration of the African Coast continued and reached the latitude of current Sierra Leone when Prince Henry died (1460). The pace of exploration continued toward the southern tip of the African continent, although more
slowly. Pessoa highlights the leadership of Henry the Navigator: “God wills, man dreams, the work is born”.

The plan to bypass the Silk Road was set in motion in 1487, when two explorers, Pedro da Covilhã and Afonso Paiva, were dispatched to India by land and Bartolomeu Dias sailed around the Cape of Good Hope. A new maritime route to India around the African Continent was in sight, but unforeseen events delayed the completion of the voyage. Meanwhile Christopher Columbus, sailing at the service of the Spanish Catholic Kings, reached the Caribbean Islands in 1492, spurring diplomatic negotiations among the competing Iberian nations that lead to the treaty of Tordesillas (1494). Portugal and Spain divided the world and Asia was reserved for Portuguese exploration.

Vasco da Gama departed from Lisbon in 1497 with a small fleet of four vessels, sailed around the Cape of Good Hope and reached Calicut, India, in 1498. Da Gama’s discovery of the maritime route to Asia together with Columbus arrival in America was considered by the founder of economics, Adam Smith, to be the two most significant achievements of human history (Chaudhuri, 1998).

In the second voyage to India in 1500, Pedro Álvares Cabral heading a larger fleet of 13 ships with 1800 men sailed westward of da Gama’s route and claimed Brazil for the Portuguese crown before continuing his journey. Afonso de Albuquerque occupied Ormuz (1507), Goa (1510), and Malacca (1511), effectively capturing large part of the trade between Asia and Europe. Within two decades of the discovery of the maritime route to Asia, the Portuguese had created a large seaborne empire with intense trade among harbors around the Indian Ocean (Boxer, 1969). Exploration continued and the Portuguese were the first Europeans to reach China after Marco Polo and the very first to arrive in Japan in 1543. The Jesuits, an order founded in 1540 by the Spanish priest Ignatius of Loyola, were thereafter a constant presence in the Iberian Explorations.

PLANT SCIENCES IN THE RENAISSANCE

The period known as “Renaissance” refers to a “rebirth of arts and letters” that occurred in Europe between the 14th and the 17th centuries and marks the beginning of the Modern Age. Single landmark events that have been used to signal this transition from medieval to modern times include Gutenberg’s Bible printed with movable type (1452), the fall of Constantinople (1453), and the arrival of Columbus in America (1492). Initial Portuguese and Spanish explorations during the 15th and 16th century are part of the large cultural movement of the European Renaissance and contributed to the emergence of the modern spirit.

An interest in classic Antiquity in the arts and humanities and the central role of observation, leading to the questioning of authority, are key cultural changes of this period. Herbals and treatises of natural history from Greek and Roman authors, often maintained or adapted by Islamic or Byzantine scholars, were revisited. Theophrastus’ works on botany, Pliny’s *Naturalis historia*, Galen’s *De simplicium medicamentorum temperamentis ac facultatibus*, Dioscorides’ *De materia medica*, Serapion’s treatise on herbs (*De simplicibus medicinis*) and other works circulated in 15th century Europe. These treatises, however, often failed the test of observation. As an example, note the coexistence of factual illustration of *Malvaviscus* with the freedom of imagination used to depict the mandrake in a 15th-century Latin Dioscorides (Fig. 1). No wonder that Phelps (1836) considered that “from the days of Theophrastus until the beginning of the 16th century, Botany, instead of becoming more perfect, had been rendered more obscure.”
Renaissance men would no longer accept authority as a criterion for truth. The *magister dixit* of Scholastic Philosophy would be submitted to the empirical test of observation. This cultural change was a fundamental prerequisite for the emergence of the scientific spirit. In addition, the Discoveries gave a significant contribution for the emancipation of Botany and its emergence as a scientific discipline, independent from Medicine and Pharmacology. Among the driving forces for botanical development during this period was the challenging task of describing and identifying the new plants species arriving in Europe from other continents, and the need to translate plant names between Latin, Greek and the several vernacular languages. In fact, it is during the 15th and 16th centuries that botany acquires its independent object, although it had to wait for Carl Linnaeus in the 18th century to start acquiring its theoretical framework.

**GARCIA DA ORTA AND THE SPIRIT OF THE RENAISSANCE**

The Portuguese Garcia da Orta (1500–1568), the first western botanist in Asia, illustrates the spirit of the Renaissance as related to the Plant Sciences. Orta studied medicine in Salamanca and Alcalá de Henares and taught at the University (*Studium Generale*) in Lisbon before going to Goa, India, in 1534. In 1563 he published his *Colloquies on the Simples and Drugs of India* (Orta, 1891) where he reports almost three decades of observations, and questions common wisdom and classical treatises with the

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Fig. 1. Illustration from the Codex Chigi F VII.158, a 15th century Latin Dioscorides from the Vatican Library representing mandrake (*Mandragora officinarum*) with roots human form, male and female, and a *Malvaviscus arboreus* below.
objectivity and empiricism that characterize the spirit of the Modern Age. A summary of the book, written in vernacular Portuguese, was translated into Latin by Charles de l'Écluse and became an influential botanical treatise in Renaissance Europe. In fact, plants and plant products from Asia were very poorly described in the botanical treatises that circulated in Europe. A parallel has been noted between Orta’s *Colloquies* (1563) and the *Dialogue Concerning the Two Chief World Systems* by Galileo Galilei (1632) (Mendes, 1993). Both were written in vernacular and made use of the same literary artifact to stimulate the debate—a dialogue between two archetypical characters symbolizing the mental attitudes in dispute. Although Orta’s use of observation reflects an earlier stage of the development of scientific method, in contrast with experimentation and inductive generalization used by Galileo in the *Dialogue*, the *Colloquies* should rightfully take its place in the contributions that lead to the scientific revolution of the 17th century (Mendes, 1993).

The observations of Orta on *Folium indicum* can be taken as examples of this new attitude (Orta, 1891): “This leaf does not float in water as described by Dioscorides in book I, chapter II, followed by Pliny in his book 12, chapter 16 [...]”; “The scent of these leaves is not as strong as that of muskroot [*Nardostachys jatamansi*] and they are not harvested as reported by Dioscorides [...]”; “Pliny says, in book 12, chapter 26, that *Folium* trees grow in Syria and Egypt [...] I do not know if they grow in Syria and Egypt. I’ve asked physicians in Damasco, Alepo and Memphis and they all have denied that it existed in Syria and Egypt.” Direct observation and enquiry corrected the old writing and replaced the voice of authority.

In the discussion regarding cinnamon Orta’s counterpart in the dialogues, Ruano, questions about cinnamon bread preserved since the times of the Roman Emperor Arcadius. Orta replies that either the cinnamon bread was preserved by the grace of God or it was a fraud. He goes further and does not hesitate to state that “one learn more in one day now with the Portuguese than the knowledge gathered in one hundred years by the Romans” (Orta, 1891). This sentence reflects not only the faster pace of knowledge accumulation but also the change in priority regarding the sources of knowledge: Observation of Nature instead of books written by others (“by the Romans”) (Mendes, 1993).

This modern approach to reality was captured in the verses by the Portuguese poet Camoes in homage to Orta’s book:

"Favour the ancient
Science which Achilles held in esteem;
Look, because you must see
What was revealed in our time
The fruit of a Orta [garden, a pun on Orta’s name] where
New plants bloom, unknown to scholars."

Humanities and sciences were not two separate cultures for the Renaissance scholar. Orta was also symbolically associated with the cultural changes that marked the closing of the Portuguese and Spanish minds in the 16th century. In 1580, he was condemned post-mortem by the Inquisition for the “crime” of “Judaism”, his bones exhumed and burned.
Several European authors used Orta’s influential book to elaborate their own treatises, including Cristóvão da Costa (Burgos, 1578), a Portuguese physician who wrote in Spanish about Asian plants and drugs (Cortesão, 1993).

Garcia da Orta gave detailed descriptions of plants but Manuel Godinho de Erédia (c. 1558–1623) was the first Portuguese author to illustrate Asian crops in a realistic way in his *Summa of Trees and Plants from India intra Ganges*, a medicinal herbarium published in Goa in 1612 (Everaert, 2001). An adventurer and cartographer with no formal training as a botanist or physician Erédia drew 72 illustrations of plants and fruits observed in India in the early 17th century, including crops of American origin, e.g. cashew, guava (Fig. 2), pineapple, and papaya.

**ASIAN CROPS AND THE PORTUGUESE DISCOVERIES**

**Discoveries and the Diffusion of Crops**

Transported as food, medicine, and source of profit or by simple curiosity, plants and their products were a daily presence in the Portuguese Discoveries. The role of the Portuguese in the dissemination of crop plants around the world has been reviewed by Ferrão (2005).

Among the triggers for the initial Portuguese expansion in 1415 was the search for cereals (Magalhães, 1998). Ceuta was an important centre for the trade of wheat. Wheat was also the first crop to be introduced in the Madeira Island, where yields were initially high. As explorations moved to lower latitudes, wheat introduction was also attempted. The failure to introduce wheat in St Tome was noted despite the lack of understanding about vernalization and photoperiodism. The Anonymous Pilot writing ca. 1545 states that “attempts to grow wheat in these island have been made several times, in different seasons […] but the spike does not fill, grows in height like grass without a single grain in

![Fig. 2. Illustrations by Erédia (1612) depicting the American fruit trees cashew and guava grown in India.](image)
the spike”. Later in the century, spices became a major motivation to advance the Discoveries.

The Islands of Madeira, Cape Verde, and the Canary served as hubs for the acclimation of tropical and temperate plants in transit around the world. Their proximity with the European mainland and their sub-tropical thermal regime, intermediate between the Mediterranean and the Tropical, created adequate conditions. The islands of Madeira and Porto Santo worked as a large experimental farm for crop production. Madeira was rich in wood. Porto Santo abounded in the native dragon trees (Dracaena draco) rapidly explored for the dye, a bright red used in the color palette of Renaissance painting. Wheat, vines, and sugar cane were initially introduced from the mainland. In time, vessels in transit to and from the South Atlantic left a myriad of plant species in Madeira and the other Atlantic islands.

The intensity of plant movements can be assessed by the statement of Pigaffeta and Lopes, writing in 1591 and referring to St Helena Island, “every ship brings and plants some fruit or herb from the garden, which grows without assistance.” Sailors moved plants and plant products between Europe, Asia, Africa, and America in every direction much before European naturalists would embark on expeditions to study and gather plant material. Interestingly, very few changes in the major crops occurred in Asia. The new crops of American origin introduced by the Portuguese and Spanish in Asia were not widely adopted in the region (Grigg, 1974).

The major food crops of Asian origin were known in Europe during the middle ages but a few deserve a special mention. These selected examples illustrate the central role of Asian crops in the Discoveries.

Sugar Cane as the Fuel
In its beginnings the Portuguese Discoveries were a venture fuelled by an Asian crop. Sugar cane (Saccharum officinarum) provided the funding for the explorations until the Cape of Good Hope was reached (Ferrão, 2005). Sugar cane was known in Europe since the times of Alexander the Great. It had been grown in Mediterranean countries, including in the Portuguese region of Algarve, and in the Western Cost of Africa where the Arabs introduced it in the 10th century. Venice had developed a plantation system of sugar cane in Sicily. Henry the Navigator imported the know-how and established sugar cane in Madeira. In subsequent expansions the crop was introduced in Cape Verde, St Tome, and Brazil, replicating and expanding the plantation system learned in Sicily.

The Need for Botanical Knowledge
Similarities between crops from different origins were noted by the navigators. Rice (Oryza sativa) was also known in the Mediterranean since antiquity where it was probably introduced at the time of Alexander the Great. The Portuguese took it to Cape Verde and when Caminha (1500) reports to the Portuguese King Manuel I about the discovery of Brazil he notes that “a few of our sailors went to a village about three miles inland and brought parrots, a root called yam which is their bread, and some rice”. Caminha was likely referring to Oryza mutica, a plant of American origin (Ferrão, 2005). The Portuguese would later introduce Oryza sativa in Brazil from Cape Verde. The same document by Caminha illustrates the difficulties of botanical nomenclature at the time. The author refers several times to yam, already known to the Portuguese in 1500, whereas in fact the natives used cassava (Manihot esculenta), an endogenous staple crop. The true yam (Dioscorea sp.) would be later introduced in Brazil from Africa.
The Case for Camellia

Tea (Camellia sinensis) remained associated with Eastern Asia (China and Japan) until the 19th century. Europeans traded tea but showed little interest in introducing a slow growing crop in other regions. The Dutch are often credited with having introduced tea in Europe in 1610, but the contribution of Portuguese to the dissemination of tea in the Western Hemisphere is paramount. Catherine of Braganza (daughter of King John IV of Portugal), married King Charles II of England in 1662. Her dowry included the city of Bombay in India and she introduced the habit of drinking tea to the English court. In the 19th century tea was introduced from Brazil in Azores, where it is grown until these days.

The ornamental Camellia japonica is a typical presence in the gardens from Northwestern Portugal and Spain. In one of the first treatises on camellia, Laurent Bernard Berlèse (1838) credits the Jesuit priest and botanist Georg Kamel (1661–1706) with the introduction of camellia in Europe from Japan in 1739. The date of this putative introduction is easily refuted, since Kamel died in Manila in 1706. Berlèse also sustained an introduction in England. However, an imprint in an azulejo in the Fronteira Palace, Lisbon, dated from ca. 1668, has been regarded as a putative camellia flower (Castel-Branco, 2010), which would suggest an earlier introduction of camellia in Portugal.

Bananas

Alexander the Great found banana (Musa spp.) in the Indus valley ca. 327. Banana was disseminated in Africa and the Mediterranean by the Arabs (Ferrão, 2005). The fruit was known by the Portuguese at the time as fig and the plant as fig-tree. Garcia da Orta refers to banana as “banana-figo” (fig-banana) or “figo-da-horta” (figs-from-the-garden) and fig is the word used by Eredia to describe banana (Fig. 3). Charles de l'Écluse mentions its existence in Lisbon in 1567. It was rapidly introduced in Cape Verde by the Portuguese and in the Canary Islands by the Spaniards. Gabriel Soares de Sousa (1587) comments that bananas “were introduced into Brazil from S. Tome where its fruit is called banana whereas in India they are called figs-from-the-garden.”

Sweet and Sour Oranges

Oranges are another fruit crop of Asian origin that benefited from the Portuguese voyages. The sour orange (Citrus aurantium) had been introduced in the eastern Mediterranean at the time of Alexander the Great, and disseminated by the Jewish diaspora. The Arabs introduced the sour orange in the Iberian Peninsula in the 8th century and promoted its culture. It is not clear whether the sweet oranges (Citrus sinensis) were already known in Europe in the beginning of the 16th century or were introduced by the Portuguese (Ferrão, 2005). Orta describes the Indian oranges as sweeter than the Portuguese. Comments about the sweetness of oranges in the Indian Ocean abound in Portuguese chronicles of the time (Ferrão, 2005). Despite the possibility of previous introductions of sweet oranges, it seems that the Portuguese in fact introduced in Europe a sweeter orange, species or cultivar. This justifies the fact that the word “orange” derives from the word “Portugal” in several languages around the Mediterranean and Asia Minor: Portokale (Albania), Portughal (Kurdistan), Portugaletto (Piemonte) and Portugales (Greece). The Portuguese introduced the crop in Brazil, currently the leading orange producing country.
Spices

Spices were a prime motivation for the Portuguese to dominate trade in the Indian Ocean. Before reaching India in 1498 the Portuguese sought African spices, obtained in the so called Malagueta Coast. Although not as lucrative, *Aframomum melegueta, Piper guineense*, and *Amomum granum-paradisi* were acceptable replacements for black pepper (*Piper nigrum*).

Black pepper, ginger (*Zingiber officinale*), clove (*Syzygium aromaticum*), cinnamon (*Cinnamomum zeylanicum*), nutmeg and mace (*Myristica frangrans*) were the main spices traded by the Portuguese in the Indian Ocean during the 16th century. Pepper, however, was the most profitable spice and dominated trade between Europe and India. Despite the high prices fetched in Europe, clove and nutmeg, obtained in the Moluccas and Banda, respectively, were much less profitable due to the high costs of acquisition and transportation (Boxer, 1969).

Black pepper from the Malabar Coast was introduced in the Moluccas, and by the Portuguese in Africa and in Brazil, creating the Brazilian spice center. Brazil is still a major a producer of pepper.

The best cinnamon was not produced in India but in Ceylon (Boxer, 1969). The Portuguese explored Ceylon in 1506 and occupied the island in 1518. Cinnamon was introduced in Africa and Brazil (Ferrão, 2005), likely in the 16th century after Ceylon and the cinnamon trade were captured by the Dutch. Sá de Miranda, a Portuguese Renaissance Poet, criticizing the severe depopulation of Portugal (Boxer, 1969), used cinnamon as a proxy for the spice trade: “I’m not afraid of Castel/ where war does not yet come from /but fear Lisbon/which by the scent of cinnamon/ our kingdom depopulates.”

Fig. 3. Illustrations from the *Summa* of Erédia, 1612, depicting banana plant and fruit. Note the designation of fig-tree (*figueyra*) and figs (*fygos*), for the plant and fruits, respectively.
The Moluccas, known as the Spice Islands, were the source of clove. Clove production was maintained under tight control over production by Portuguese and later on by the Dutch, and only disseminated in the late 18th and early 19th centuries. Nutmeg and mace were grown in the Banda Islands. Orta states that nutmeg does not flower in the Moluccas or in Ceylon.

The horticulture of spices in the 16th century is largely unknown. However, the anecdotal information available suggests that it was very poor. Cinnamon was gathered from the natural vegetation. Whole trees were cut down to harvest the buds so that it took five years between crops (Ferrão, 2005).

CONCLUSION

The Portuguese Discoveries, together with the Spanish, is part of the large movement of the European Renaissance. Mind-opening voyages helped to develop a culture of observation and multiplied the number of new plants requiring description and classification. Despite the practical emphasis on food and trade, and even in the absence of a theoretical framework for interpretation, botany and horticulture received a strong impulse. Botanical and horticultural knowledge about Asian crops was revised and amplified. The selected examples presented show that plants and their products were a permanent companion of the Portuguese Explorations in the first phase of globalization.

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Literature Cited


