

PLANT SPECIES INTRODUCED IN INDIA VIA THE SEA– WITH REFERENCE TO PORTUGUESE COLONIZATION

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Abstract: Trade between India and the Western world goes back to the Harappan civilization, when trade was with Babylonia and Mesopotamia in 2000 BCE. Over the years, the trade between India and the western countries continued through the sea route. For centuries past, adventurous mariners were cautiously crossing the Arabian Sea to reach ports in Malabar Coast for trade in Indian plants but it was a highly risky journey with no certainty of reaching the destination. After the discovery of the phenomenon of monsoon by Hippalus in the early years of the 1st century AD, ships from Egypt could sail more predictably in July and blown with the South-West monsoon, reaching Malabar in September. They could return from Malabar in November with the North-East monsoon and reach back in ports like Myos Hormos, Egypt, in the next February. It was still indeed a risky journey but making use of the trade winds many Arab and Greek ships came here laden with gold and returned with spices and aromatic plants. They were also importing from here rice, oil of sesame, cotton and sugar. After the venture of Portuguese in the trade with India and their lust for introduction of valuable species back to Lisbon lead to accidental entry of important species in India from the western world. The paper deals with these species and how these have contributed to the economy of the country.

I. Introduction

Exchanges between India and the Western world go back to the Harappan civilization, which used the sea route to trade with Mesopotamia, today's Iraq, from 2000 BCE. Over the succeeding millennia, Arabs, Egyptians, Persians, Greeks, Romans and other Europeans came to value the spices, aromatic plants and medicinal plants of India highly. Such were the rewards of returning with these valuable cargoes, adventurous mariners made risky journeys that they had no certainty of completing.

Once the Greek merchant Hippalus discovered the phenomenon of the monsoon, in the early years of the 1st century AD, ships from Egypt were able to sail more predictably to the vibrant markets of the Malabar coast. Leaving in July, their vessels were blown by the south-west monsoon, reaching Malabar in September. They made the return journey in November, driven by the north-east monsoon winds, reaching ports such as Myos Hormos by the following February. It was still a difficult journey, but the trade winds ensured that many Arab and Greek ships came here laden with gold; they returned with spices, aromatic plants, rice, sesame oil, cotton and sugar.

After the dissolution of the Roman empire, Europeans did not contest Arab control of the Indian Ocean again until the late 15th century. Then, the Portuguese began to challenge Muslim commercial supremacy. In 1487, Pedro da Covilha left Portugal on a secret mission to investigate the spice trade. Disguised as a Moorish merchant, he sailed in an Arab ship from Aden to Cannanore (near Calicut) on the Malabar coast, becoming the first Portuguese to set foot on Indian soil, in 1488. Vasco da Gama continued another reconnaissance mission to India, also begun in 1487, by his compatriot Bartolomeu Diaz. With the help of a Gujarati navigator, his fleet reached Calicut on 20th May 1498 and stayed there for about four months. Encouraged by this success King Manuel of Portugal sent Pedro Alvares Cabral, with 12 ships, 1,500 soldiers and eight catholic missionaries, along with the blessings of the Roman Catholic Church, with orders to establish a trading post for spices at Calicut and to spread Christianity in Malabar. His fleet left Portugal on 8th March 1500, sailing southward, but,

due to strong east winds, they were blown away to the west and landed in Brazil. That diversion was to have major repercussions for the plant exchanges in the Indian Ocean World.

1.1 The Introduction of New Plants In India

The introduction of new plants in India from goes back to the voyage of Cabral from Brazil.

Before leaving Brazil to continue his voyage to India, Cabral collected several plants, including cassava (tapioca), cashew, pineapple, chillies, papaya, sweet potato and maize, intending to try to cultivate them in Portugal. However, four of his ships were destroyed by a severe storm near the Cape of Good Hope and, when he finally reached Calicut, his Brazilian specimens were wilting and dying. To save them, the remainder was planted, with the permission of the local king in Malabar. This was the beginning of foreign plants grown in India, far from their place of origin.

When Cabral set sail for home back again, he carried pepper plants with him, once more with royal permission, to plant in his home soil. Several merchants and travellers who came with or followed Da Gama and Cabral have left accounts of Malabar, prominent among them being Cesare de Fedrici, a merchant from Venice, and Ludovico di Varthema of Bologna. Thus, the Portuguese were the first to document the plant species of Malabar Coast.

The historical evidences give a conflicting analysis regarding the exact period of introduction of alien species in India. Art historical studies have indicated the presence in India of some of these alien plant species long before the arrival of Portuguese. For example, the pineapple is depicted in the 5th-century Udayagiri cave temple carvings, in Madhya Pradesh (Gupta). Likewise, the cashew nut and custard apple appear in the 2nd-century BC Bharhut stupa balustrade relief (also in Madhya Pradesh), as well as at Kakatiya, Karnataka (from 12th-century carvings). Though there is mention of the introduction of cashew and pineapples before the entry of Portuguese, however the latter were first to introduce the species along the Malabar Coast and popularized the species within the local community.

Jaweed Ashraf points out that it is clear, by the end of the 17th century, the Portuguese were actively testing the cultivation of plant varieties from their colonies in different parts of their empire. They tried cultivation in places that offered not only similar environments, but also more stable political conditions, in an attempt to secure maximally yielding forms. Thus, in March 1680, Lisbon reminded its ambassador in Goa, Antonio Paes de Sande, that he needed to fulfill orders sent to his predecessor to send seedlings of clove, cinnamon, pepper, nutmeg and garlic, together with instructions for cultivation, on an annual basis for planting in Brazil. This was the era when cultivation trials of species other than its area of origin were conducted.

Apart from pineapple and cashew, the Portuguese brought other species, such as the African doum palm (*Hyphaene dichotoma*). Arab sailors used the oil extracted from its kernels to burn in lamps during voyages. Long-standing trade between India and the Western world ensured that this was already known, but it was left to the Portuguese to plant the species in areas they settled, especially in Diu and Daman.

II. Large scale propagation and its relevance in Indian economy

After the introduction of the cashew and pineapple in the Malabar region, the cultivation was restricted to local region only. The English name cashew derives from the Portuguese for the fruit of the *caju* tree (pronounced ka'zu), which itself is derived from the Tupian word *acajú*, literally meaning a "nut that produces itself". The Portuguese quickly added the cashew into Goan cookery in the form of both roasted and raw kernels, used for making curries and sweets. The cashew was thus added to the Indian cuisines and this lead to large scale demand and cultivation thereafter. Slowly, the farmers replaced their traditional crops with the cashew cultivation and today it is grown mainly in peninsular states of India particularly along the coastal states like Kerala, Karnataka, Goa, Maharashtra, Tamil Nadu Andhra Pradesh, Orissa and West Bengal (Mohod et al., 2010). The 2016 data from FAO indicates that India is the third largest producer of cashew in the world with annual production of 671,000 Tonnes (Table 1).

Table 1: Top countries for production of cashew nut in 2016

Countries	Production in Ton
Vietnam	1,221,070
Nigeria	958,860
India	671,000
Costa de Ivory	607,300
Phillippines	216,398
World total	4,898,210

After the pineapple's arrival on the Malabar coast in the early 16th century, its medicinal properties were swiftly recognised by locals. It wasn't until 1810 that these were documented in *A Catalogue of Indian Medicinal Plants and Drugs* by John Fleming, but its health-restoring benefits had been established by then for at least 100 years (Manilal 2012). Requiring little maintenance, it was an easy crop; cultivation soon became widespread across the country and, currently, India is the sixth-largest global producer with 1.57 production of million tonnes per annum in 2016. Top four pineapple production countries are Costa Rica, Philippines, Brazil and Thailand (FAO 2016). Pineapple is grown in India in the South peninsular coast, northeast and northwest states (Figure 3).

Table 2: Pineapple production countries of the World (2016)

Countries	Production in Tonnes
Costa Rica	2,685,131
Brazil	2,483,831
Phillippines	2,458,420
Thailand	2,209,351
Indonesia	1,837,155
India	1,570,100
World total	24,800,000

Source: FAOSTAT of the United Nations

So we can see that the large-scale propagation of any introduced species depends on the level of adoption by local people. The cashew, pineapple, chilli, potato and papaya, though initially exotic, became part of India's cuisine. In time, they were all grown on a large scale and have come to play a major part in the country's economy.

III. Environment repercussions

It has not all been good news, however in terms of environmental problem. Although cashews and pineapples have brought major economic gains, cashews particularly have been responsible for substantial environmental degradation. As a non-native, the plant is susceptible to pest attack especially trips and bugs. To prevent this, insecticides and pesticides have been widely used without regulation of dosages or application methods. To control mosquito breeding in cashew plantations, Endosulfan, a persistent organic pollutant, was sprayed from the air between 1976 and 2000 over 12,000 hectares of Kasaragod district, Kerala. This covered 15 villages and within few years, congenital anomalies, mental retardation, physical deformities, cerebral palsy, epilepsy and hydrocephalus was reported from this district forcing the government to ban the pesticide. Today, the entire district is affected; soil and water contamination make this difficult to reverse.

Another small scale environmental problem is with the cashew processing industries. The pollutant emission load in to environment by a single cashew nut unit is low, it has been observed that the total emissions load by number of such units in a cluster causes considerable environmental degradation (Mohod *et al.*, 2010). It has become necessary to study the entire cashew nut processing industry sector in India to suggest technologically feasible environmental standards.

Pineapple cultivation with advantages of low maintenance and high returns has resulted in diversion of forestlands towards agriculture and loss of traditional cropping pattern.

Today, the introduction of exotic species is governed by strict rules and tight policy. But, as the negative outcomes of the embrace of the cashew show, the exchange from sea trade five centuries ago can have a very substantial wake.

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