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The epic Mahabharata: Socioculture and plant invasion in Indian subcontinent

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Abstract
Plants have been held sacred to communities the world over, besides their materialistic importance. They even feature in treatises and epics. Their survey constitutes an important path in research. Mahabharata, an Indian epic, is replete with references to the elements of biodiversity. The present author scrutinised it to pinpoint especially exotic plant species reveling plant invasion and socioculture in ancient India. As many as 22 exotic angiospermic species are gleaned belonging to 21 genera and 18 families from Old and New Worlds. Majority of them are cultigens (15 species) useful for various purposes. Some of them are discussed from the standpoint bioculture even in modern period. It is, therefore, appealed to have all-pervasive examinations of such ancient epics and scriptures for the well-being of mankind and management of local biodiversity.

Keywords: epic Maharashtra, exotic plants, invasion, socioculture

Introduction

The great Hindu epic Mahabharata is a tool to study flora of the then Indian subcontinent. Such an epic reflects human life and natural elements prevailing in the respective period. We all are quite aware that the epic Mahabharata is interwoven with the life and battle of Pandavas and Kauravas. It is also needless to state that the Pandavas underwent a period of exile. When Yudhisthira (a Pandav brother and crown prince) looses everything in a game of dice with Duryodhan (a Kaurav cousin). This period was meant for 12 years of dwelling in the forest and to be followed by a year of exile incognito.

The Mahabharat is the longest epic poem consisting of over 1,00,000 slokas (couplets) in Sanskrit. It is divided into 18 parvans (sections). Of these, the third Aranyakaparvan section of the epic contains information about plant world. It is thought composed in the 4th century BCE or prior to it. It is one of the important text of ancient India. It is also known that originally the story of Mahabharata was conceived by the great sage Vyasa.

The epic has been investigated time and again by historians, archaeologists and writers in India and abroad. The present author drew special attention to the alien plant species depicted in it. It is assessed from the perspective of plant invasion in the ancient epic period in India.

Methodology

The data on plant species was borrowed from various literary works (Dutta, 2008; Rajagopalachary, 2008; Sarkar, 1995) [6, 24, 27]. Their alien status was deciphered consulting relevant taxonomic literature as mentioned against each plant species. Information concerning habital category, wildness or cultigen is deciphered and tabulated in the Table-I. The information obtained is pertinently discussed in the perspective of plant invasion in the erstwhile Indian subcontinent.

Table 1: Exotic Plant Species in Epic Mahabharata.

Sr. No. 1	Plant Species & Family 2	Sanskrit Name 3	Wild (W) /Cultivated (C) 4	Habit 5	Nativ Region or Country 6
1.	*Acacia farnesiana* (L.) Willd. Mimosaceae	Arimed	W	T	Tropical South Africa: Reddy, 2008 [25]; Purseglove, 1968 [23]. Australia, Africa, Mexico & Texas: Graf, 1980 [8]. Australia: Chandra Sekar, 2012 [2].
2.	*Albizia lebbeck* (Linn.) Benth. Mimosaceae	Shirisha	W	T	Pantropical Africa & Tropical Asia: Bhandari, 1978 [1].
3.	*Bauhinia variegata* L. Caesalpiniaceae	Kovidara	C	T	China: Debnath & Debnath, 2017 [5]; Pullaiah & Ramamurthy, 2001 [22].
4.	*Bombax ceiba* L. [Syn.Salmalia malabarica (DC.) Schott. & Endl.]	Salmali	W	T	America & Australia: Mykhopadhyay & Chakraverty, 2008 [13].
5.	*Borassus flabellifer* L. Arecaceae	Tala	C	T	Tropical Africa: Reddy, 2008 [25]; Chandra Sekar, 2012 [2].
6.	*Calotropis gigantea* (L.) R.Br. Asclepiadaceae	Arka	W	S	Tropical Africa: Reddy, 2008 [25]; Patil, 2017 [16].
7.	*Calophyllum inophyllum* L. Clusiaceae	Varanpuspa	W	T	East Africa: Pullaiah & Rao, 2002 [21]. Tropical Asia: Mukhopadhyay & Chakraverty, 2008 [13].
8.	*Cassia fistula* L. Caesalpiniaceae	Karnikar	C	T	North America: Debnath & Debnath, 2017 [5]. Tropical Asia: Mukhopadhyay & Chakraverty, 2008 [13].

9.	*Citrus medica* Linn. Rutaceae	Bijapuraka	C	T	China: Roxburgh, 1814 [26].
10.	*Euphorbia neriifolia* L. Euphorbiaceae	Snuha, Snuhi	C	S	Africa: Naik, 1998 [14].
11.	*Ficus religiosa* L. Moraceae	Aswatth, Plaksha	W,C	T	Europe: Stewart, 1972 [32].
12.	*Flacourtia jangomas* (Lour.) Raeusch (Syn.F.cataphracta Roxb.) Flacourtiaceae	Tilaka	C	T	Tropical Asia: Martin, *et al*., 1987 [11].
13.	*Hibiscus rosasinensis* L. Malvaceae	Japa	C	S	China: Patil, 2003 [15], 1995; Shetty & Singh, 1987 [29]; Paul & Krishnamurthi, 1967 [20].
14.	*Imperata cylindrica* (L.) Raeusch Poaceae	Darbha	W	H	Tropical America: Debnath & Debnath, 2017 [5]; Reddy, 2008 [25]. Asia (Excl. India) & Europe: Kaul, 1986 [9]. Tropical Asia: Titiek *et al*., 2017 [33].
15.	*Lagenaria siceraria* (Mol.) Standl. Cucurbitaceae	Alabu	C	C	Africa: Singh & Nigam, 2017 [30].
16.	*Linum usitatissimum* L. Linaceae	Atasipuspa	C	H	Mediterranean Region: De Candolle, 1959 [4]. Europe: Dar *et al*., 2002 [3].
17.	*Nerium indicum* Mill. (Syn.*N.oleander* L.) Apocynaceae	Karvira	C	S	Mediterranean Region: Singh *et al*., 1991 [31]. China, Cochin China: Voight, 1845 [34].
18.	*Phoenix dactylifera* L. Arecaceae	Kharjura	C	T	Persian Gulf: Patil, 2019 [18]. Arabia & North Africa: Graf, 1980 [8].
19.	*Punica granatum* L. Panicaceae	Dadima	C	T	South Asia: Gaikwad & Garad, 2015 [7]. Afghanistan, Baluchistan & Persia: Patil, 2003 [15]; Shetty & Singh, 1987 [29].
20.	*Saccharum sara* Roxb. Poaceae	Sara	W	H	Lebanon; Moldenke & Moldenke, 2002 [12].
21.	*Spondius pinnata* (L.*f*.) Kurz. Anacardiaceae	Amrataka	C	T	Tropical Asia: Martin *et al*., 1987 [11].
22.	*Ziziphus jujuba* Mill. Rhamnaceae	Badari	C	T	Subtropics & Warm Temperate Zone: Martin *et al*., 1987 [11].

Results and Discussion

India is one of the mega biodiversity countries of the world. It is culturally rich. India has also rich literary heritage. The four Vedas, Samhitas, Puranas, etc. are not mere stories of myths and beliefs. The importance of plant world is embodied in them. This is also a fact in the great Sanskrit epics *viz*., Ramayana and Mahabharata. These epics have been also devoted to the forests. One of the division (Kanda) in Ramayana in Aranya Kanda (Aranya-jungle) which informs on some plant species (Patil, 2018) [17]. Likewise, in Mahabharata, one of the Parva (division) is Aranyaka Parv (Aranya-jungle). The name itself is suggestive of forests and floral elements. These have not received desired attention. The present author directed his effort to know particularly exotic plant species contained in it to highlight plant invasion in the said ancient period of India.

An account of exotic plant species tabulated in the Table-I indicates that total 22 species belonging to 21 genera and 18 families of angiosperms are informed in the epic Mahabharata. Of these, monocotyledons are represented by 04 species belonging 04 genera and two families. Majority of the exotic species belong to the dicotyledons (18 species, 17 genera and 16 families). Interestingly, out of total species, majority of them are cultigens (15 species). They seem to be useful as shade trees, religious, oil-yielding, fibre-yielding, edible fruit yielding and ornamental ones. Few exotic species (06 species) appear to have naturalised in the Indian environment. They seem to be the product of natural mechanism of plant dispersals through their propagules or diaspores. These exotics belong to different habital categories *viz*., trees (14 species), shrubs (04 species), herbs (03) species and a single climber. The aborescent species share major segment of exotics.

These exotic taxa exhibited different nativities from Old as well as New World. Fair representation numerically pertains to Africa (10 species), Asia (Excl. India) (05 species) and American continent (05 species). Some countries or regions have also shared like China and Cochin China (04 species), Australia (03 species), Europe (03 species) and Mediterranean region (02 species). There are few counties or regions which shared a single exotic species each such as Persian Gulf, Lebanon, Arabia, Baluchistan, Afghanistan, Subtropical and warm temperate zone.

The above resume indicates that the plants of the distant continents like America or isolated distant countries as Australia reached Indian subcontinent in pre-Columbian period. *Ficus religiosa* is reported by Stewart (1972) [32] as exotic to India from Europe. If we accept it, then it is interesting to note that this tree has intimately interwoven with bioculture in India, being religious. It is planted at religious places or in common places for shade. It also runs wild all over. Another candidate *viz*., *Imperata cylindrica*, a grass species, occurs in tropical America, Europe and also in Asia including India. It is called 'Darbha'. This grass is held religious (although exotic in India) and has several legends associated with Hindu god, goddesses and Sthala-Purana (Patil, 2020) [19]. Its migration from Europe to India can be conceived through terrestrial routes but what is its connection with America and that too in pre-Columbian period appears unanswered since it is mentioned in the epic Mahabharata (obviously a pre-Columbian scripture). A case of *Annona squamosa* L. (Custard Apple) is an American floral element but is documented in the another Epic Ramayana which is also a pre-Columbian scripture (Patil, 2018) [17]. Interestingly, its common name in India is appropriated with the name Sita, Lord Rama's consort. Still another American species *Annona reticulata* L.is used in religious worships in India and called 'Ramphal' in the name of Lord Rama, (Khare *et al*., 2020) [10].

There are several such examples and histories about appropriation of exotic plants in Indian bioculture (Khare *et al*., 2020) [10]. Schultes (1960) [28] once rightly remarked that

the survey of the literature constitutes an important path of research. It is especially true in case of ancient and religious scriptures that too written in a morbid language like Sanskrit. The present author, therefore, appeal to workers in plant science not to ignore scripts of cultural significance.

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