



Surapala's Vrikshayurveda In The Context of Plant Invasion In Ancient India

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Abstract

Surapala's Vrikshayurveda is important from the standpoint of plant science, agriculture, horticulture, arboriculture, conservation and medicine. It has been revealed in these compartments of knowledge but remained untapped in the context of bioinvasion. The present author, therefore, extended investigation revealing exotic plant taxa from this ancient Sanskrit manuscript. A total of 67 exotic plant species pertaining 61 genera and 38 families of angiosperms are limelighted. They are analysed regarding their cultivation or wildness. The results obtained so far are discussed in the light of plant invasion (bioinvasion) in ancient period on Indian subcontinent. Such revelations help understand the composition and status of Indian biodiversity which is important from the conservation point of view of Indian plant wealth.

Key Words: Surapala's Vrikshayurveda, Exotic Plants, Bioinvasion, India.

Introduction

Surpala's Vrikshayurveda contains only 60 pages having margin on either side of the manuscript. Every page have generally 06 lines (rarely 05 or 07 lines). Each line have usually 30 characters which are bold. It is in old form of Deonagari script, which is written neatly in a uniform hand. The text is in the form of verses. Prose finds place after a preceding topic while concluding and commencing a new topic. It contains a total of 325 verses. Some verses and lines, however, are missing. The author has also referred earlier ancient texts and hence the information provided can be presumed authentic. He covered many aspects of plant science, ecology, agriculture, horticulture, medicine, gardening, geology, etc. His attempt certainly merits a scientific work. Opinions of experts differ about period of Surpala from 10th to 14th century. Subhashree, however, places Surpala in the 10th century AD.

Methodology Adapted:

The original Sanskrit script viz., Surapala's Vrikshayurveda is made available by Sadhale (1996). It contains Sanskrit common plant names. These are equated with recent (Latin) botanical names and assigned to their respective families of angiosperms. These are further revealed for their habital categories and status regarding wildness or as cultigens. Each plant species is analysed for their exotic status consulting relevant taxonomic literature provided against each of them. The information so accrued is discussed in view of plant invasion (bioinvasion) in ancient time of India indicating antiquity of each plant taxa.

Results & Discussion:

The Sanskrit verses in Vrikshayurveda by Surapala inform the importance of plants in the life of mankind. It sheds light on various aspects of plant life in relation to well-being of humans e.g. preserving, procuring and treatments of seeds, besides technology for plantation. It also highlights land selection, soil characteristics, planting pits, irrigation methods, plant nutrition, fertilizers, plant diseases, medicine, medicinal plants, etc. (cf. Devesh *et al.* 2015; Dinesh *et al.*, 2012; Jeevankalagi *et al.*, 2022; Ramachandran, 1984; Subhashree *et al.*, 2018; Pujari *et al.* 2023). However, it has remained untapped from the standpoint of plant invasion (bioinvasion) in Indian subcontinent in the ancient period. Present is an attempt to divulge the exotic plant diversity as ingrained in this ancient text of Vrikshayurveda by Surapala.

As many as 67 plant species are revealed pertaining to 61 genera and 38 families of angiosperms. Of these, monocotyledons have a lesser role in plant invasion (10 species, 10 genera and 04 families). However, the dicotyledonous taxa have a major share (57 species, 51 genera and 34 families). Their habital categories belong to trees (27 species), shrubs (08 species), climbers (10 species) and herbs (32 species). Thus the herbaceous and arborescent species have played a major role in bioinvasion in India. These taxa are either cultivated (48 species) or run wild (18 species) in nature and form an integral part of Indian biodiversity. A single species viz., *Clitoria terneatea* is both, wild as well as cultivated.

The closer scrutiny especially of cultivated plant indicates that these species have been useful as vegetable, edible fruits, pulses, cereals, spices and condiments, ornamentals, masticatory, aromatic, etc. Obviously, these would have brought in Indian territory intentionally. The wild taxa have also some miscellaneous role in Indian economy.

The present author also gleaned exotic bio-wealth from ancient Vrikshayurveda by Parasara (1st Century BC. or 1st Century AD.). A total of 34 exotic plant species have been revealed from the said Sanskrit text belonging to 32 genera and 21 families. These are discussed in the light of plant invasion in India in ancient period. Comparatively, exotic plant taxa are more numerically and also diverse to those of Parasara's Vrikshayurveda (Patil, 2023). The investigations divulging plant wealth especially the exotic ones help shed more light on Indian biodiversity and implications thereof in the context of bioinvasion and its status. Such studies also reflect trends of contacts and trade with the other world of the then ancient Indians. It is, therefore, imperative to tap information contained in such ancient Sanskrit scriptures about which we Indians have proud feelings.

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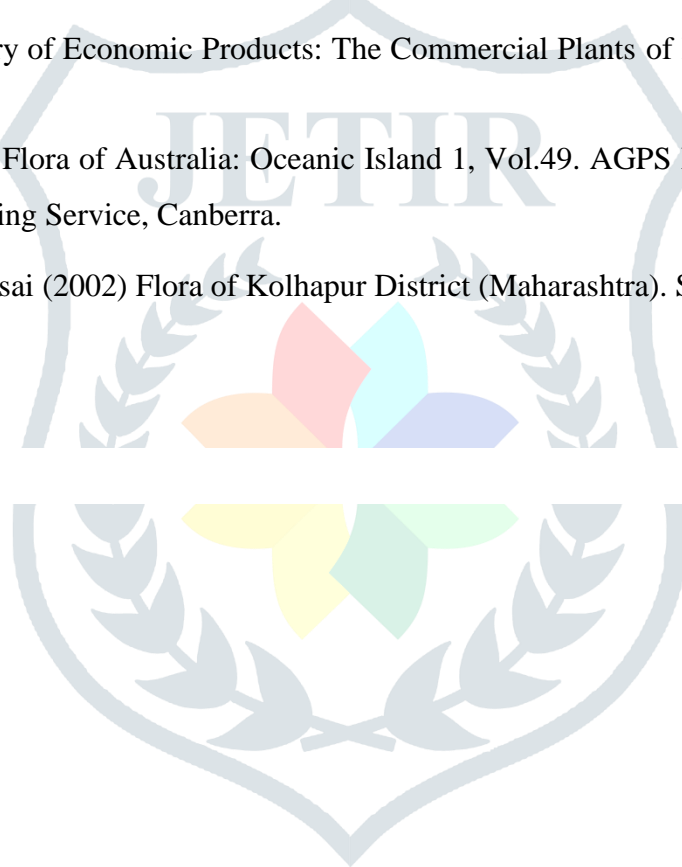


Table-I: Alien plant species in Surapala's Vrikshayurveda

Sr. No. (1)	Sanskrit Name (2)	Verse No. (3)	Botanical Name & Family (4)	Habit (5)	Wild (W) / Cultigen(C) (6)	Nativity & Reference (7)
1.	Alambutka	69, 155, 156	<i>Cucurbita maxima</i> Duch. ex Lam. Cucurbitaceae	Climber	C	i) South America: Dar <i>et al.</i> , 2002. ii) Central America: Singh & Nigam, 2017.
2.	Amrta	41, 132, 259-260	<i>Spondias pinnata</i> (L.f.) Kurz. Anacardiaceae	Tree	C	Tropical Asia: Martin <i>et al.</i> , 1987.
3.	Brihati	53, 55, 236	<i>Solanum anguivi</i> Lam. (Syn.S.indicum L.) Solanaceae	Shrub	W	Africa: Pullaiah <i>et al.</i> , 2002.
4.	Tamal	143	<i>Cinnamomum camphora</i> (L.) Nees & Eberm. Lauraceae	Tree	C	i) Japan: Matthew, 1991. ii) China; Taiwan & Japan: Lesley, 2020.
5.	Cincini	23, 48, 49, 253	<i>Tamarindus indica</i> L. Caesalpinaceae	Tree	C	i) Tropical America: Patil, 1990. ii) Africa: Pullaiah & Ramamurthy, 2001.
6.	--	230, 231	<i>Cuminum cyminum</i> L. Apiaceae	Herb	C	i) South Europe: Yadav & Sardesai, 2002. ii) Mediterranean Region: Patil, 1995; Shetty & Singh, 1987.
7.	Dadima	20, 29, 50, 87, 128-132, 246, 266	<i>Punica granatum</i> L. Punicaceae	Tree	C	i) South Asia: Gaikwad & Garad, 2015. ii) Afghanistan, Baluchistan & Persia: De Candolle, 1959.

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8.	Damda, Vartaka	88, 234, 240,287,288	<i>Solanum melongena</i> L. Solanaceae	Shrub	C	i) East Indies: Singh <i>et al.</i> , 2001. ii) America: Gaikwad & Garad, 2015.
9.	Dhanyaka	88	<i>Coriandrum sativum</i> L. Apiaceae	Herb	C	i) South Europe: Yadav & Sardesai, 2002. ii) Mediterranean Region: Shetty & Singh, 1987.
10.	Durva	245	<i>Cynodon dactylon</i> (L.) Pers. Pocee	Herb	W	Tropical Africa: Wagh & Jain, 2015; Debnath & Debnath, 2017.
11.	Kalaya	143	<i>Cicer arietinum</i> L. Papilionaceae	Herb	C	i) Mediterranean Region: Shetty & Singh, 1987. ii) South Europe: Patil, 1990.
12.	Kantala	127	<i>Citrus reticulata</i> Blunco. Rutaceae	Tree	C	i) Philippines: Almeida, 1996. ii) Asia (Excl. India): Stewart, 1972.
13.	Kankanara, Kovidara	30	<i>Bauhinia variegata</i> L. Caesalpinaceae	Tree	C	China: Debnath & Debnath, 2017.
14.	Karamarda, Caranda	48,49,93	<i>Carissa carandus</i> L. Apocynaceae	Shrub	W	i) South Africa: Sainkhdia, 2016. ii) Malaysia: Medakkar & Sharma, 2016.
15.	Karvira	50,79,80,152, 251,252,266, 289	<i>Nerium indicum</i> Mill. Apocynaceae	Shrub	C	i) China, Cochin China: Voight, 1845. ii) Mediterranean Region: Purseglove, 1968.

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16.	Kasa	138, 318	<i>Saccharum spontaneum</i> L. Poaceae	Herb	W	Tropical West Asia: Reddy, 2008; Chandra Sekar, 2012.
17.	Kuranta, Kuratka	152, 150	<i>Barleria prionitis</i> L. Acanthaceae	Shrub	C	Tropical Africa: Medakkar & Sharma, 2016.
18.	Kasamanda	69,234,275, 285,286,287, 288	<i>Benincasa hispida</i> (Thunb.) Cong. Cucurbitaceae	Climber	C	i) Java: Patil, 1995, 2003. ii) Japan & Java: De Candolle, 1959.
19.	Madhukar-Kata	282	<i>Citrus maxima</i> (Burm.) Merr. Rutaceae	Tree	C	i) Malaysia: Debnath & Debnath, 2017. ii) Probably South-East Asia: Hajra <i>et al.</i> , 1997.
20.	Mallika	50, 153	<i>Jasminum samba</i> (L.) Ait. Oleaceae	Shrub	C	Tropical Asia: John, 1891.
21.	Manjista	239, 240, 242	<i>Rubia cordifolia</i> L. Rubiaceae	Climber	W	Asia (Excl. India) & Africa: Kaul, 1986.
22.	Maruwaka	71, 73	<i>Origanum vulgare</i> L. (Syn. <i>O. majorana</i> Linn.) Lamiaceae	Herb	C	i) Europe: Kaul, 1986. ii) South Europe, North Africa & Asia Minor: Cooke, 1958.
23.	Matulunga	140	<i>Citrus medica</i> L. Rutaceae	Tree	C	China: Roxburgh, 1814; Patil, 2019b.

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24.	Mardvika	41,122,238	<i>Vitis vinifera</i> L. Vitaceae	Climber	C	i) West Indies: Gaikwad & Garad, 2015. ii) West Asia: Singh <i>et al.</i> , 2000b.
25.	Mulaka	88,284	<i>Raphanus sativus</i> L. Brassicaceae	Herb	C	i) Western Asia: Purseglove, 1968. ii) Europe & Temperate Asia: Patil, 1995.
26.	Musta	145,249,299	<i>Cyperus rotundus</i> L. Cyperaceae	Herb	W	i) Tropical Africa: Debnath & Debnath, 2017. ii) Europe: Kaul, 1986.
27.	Paravata	93,139	<i>Phyllanthus acidus</i> (L.) K. Skeels (Syn. <i>Cicca acida</i> L.) Euphorbiaceae	Tree	C	i) Malay Island & Madagascar: Patil, 2003; Yadav & Sardesai, 2002. ii) North-East Brazil: Matthew, 1991.
28.	Payasya	273	<i>Cleome gynandra</i> L. [Syn. <i>Gynandropsis pentaphylla</i> (L.) DC.] Capparidaceae	Herb	W	i) Tropical America: Reddy, 2007. ii) Africa: Hewson & Thompson, 1993.
29.	--	135	<i>Pisum sativum</i> L. Papilionaceae	Herb	C	i) Mediterranean Region: Novak, 1966. ii) West Asia: Shetty & Singh, 1987.
30.	Puga	65	<i>Areca catechu</i> L. Arecaceae	Tree	C	i) Malaya: Chaphekar <i>et al.</i> 2007. ii) Malaysian Archipelago: Shah, 2015. iii) Tropical Asia: Gaikwad & Garad, 2015.

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31.	Punnaga	43,48,49, 92,250	<i>Calophyllum inophyllum</i> L. Clusiaceae	Tree	C	i) East Africa: Pullaiah & Rao, 2002. ii) Tropical Asia: Mukhopadhyay & Chakraverty, 2008.
32.	Rajakosa, Jalini	87	<i>Luffa acutangula</i> (L.) Roxb. Cucurbitaceae	Climber	C	Tropical Asia: John, 1891.
33.	Hingu	195	<i>Ferula asafoetida</i> Linn. Apiaceae	Herb	W	Central Asia, North Africa & Persia: Roxburgh, 1814.
34.	Suryavalli	254-258	<i>Teramnus labialis</i> (L.f.) Spreng Papilionaceae	Climber	W	Pantropical: Singh & Srivastava, 2000.
35.	Tambuli	48,49	<i>Piper betle</i> L. Piperaceae	Climber	C	i) Malaysian Archipelago: Shah, 2015. ii) Malaysia: Hewson & Thompson, 1993.
36.	Tala	41	<i>Borassus flabellifer</i> L. Arecaceae	Tree	C	Tropical Africa: Reddy, 2008; Cooke, 1958.
37.	Tulasi	9	<i>Ocimum tenuiflorum</i> L. (Syn. <i>O. sanctum</i> L.) Lamiaceae	Shrub	C	North Coastal Region of Mediterranean Sea: Swamy, 1973.
38.	Tuta	87	<i>Morus alba</i> Linn. Moraceae	Tree	C	China: Lesley, 2020; Wilson, 1994.
39.	Asphota	254-258	<i>Clitoria ternatea</i> L. Papilionaceae	Climber	W, C	Tropical America: Purseglove, 1968.

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40.	Badara, Sauvira	29, 48, 49, 93, 144, 135, 308, 309	<i>Ziziphus mauritiana</i> Lam. Rhamnaceae	Tree	C	i) Tropics & Warm Subtropics: Martin <i>et al.</i> , 1987. ii) Australia: Veerasamy & Arumugan, 2014.
41.	Bhallataka	91, 153, 32, 3	<i>Semecarpus anacardium</i> L. Anacardiaceae	Tree	C	West Indies: Sainkhedia, 2016.
42.	Bijapuraka	29, 43, 141	<i>Citrus limon</i> (L.) Burm. f. Rutaceae	Tree	C	South-East Asia: Yadav & Sardesai, 2002.
43.	Eranda	30, 247	<i>Ricinus communis</i> L. Euphorbiaceae	Tree	C	i) Africa: Bailey, 1949; Purseglove, 1968.
44.	Golla	88	<i>Meyna laxiflora</i> Robyns Rubiaceae	Tree	W	South Africa: Singh <i>et al.</i> , 2015.
45.	--	186	<i>Cannabis sativa</i> L. Cannabaceae	Herb	W	i) Central Asia: Chandra Sekar, 2012. ii) Caspian sea & Caucasus Mountain: Watt, 1908.
46.	Kharjura	41, 124, 127	<i>Phoenix sylvestris</i> (L.) Roxb. Arecaceae	Tree	W	i) West Asia: Sainkhedia, 2016. ii) Aegypt (Along Nile & Aden): Almeida, 2009a.
47.	Kosataka	299	<i>Luffa cylindrica</i> (L.) M.J.Roem. (Syn. <i>L.aegyptia</i> Mill.) Cucurbitaceae	Climber	C	Egypt: John, 1891.

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48.	Kovidara	315	<i>Bauhinia variegata</i> L. Caesalpinaceae	Tree	C	China: Debnath & Debnath, 2017.
49.	Ksirika, Kshirini, Kshirindika	20, 31	<i>Manilkara hexandra</i> (Roxb.) Dub. Sapotaceae	Tree	C	South America: Sainkhedia, 2016.
50.	Kulattha	215, 276	<i>Macrotyloma uniflorum</i> (Lam.) Verdc. Papilionaceae	Herb	C	South-East Asia: Patil, 2019a.
51.	--	52, 53, 55, 142, 198	<i>Brassica nigra</i> (L.) Koch Brassicaceae	Herb	C	Europe: Naqshi & Javeid, 1987.
52.	Naranga	72, 141, 142	<i>Citrus sinensis</i> (L.) Osb. Rutaceae	Tree	C	i) China: Singh <i>et al.</i> , 2000a. ii) South China: Mukhopadhyay & Chakraverty, 2008.
53.	Nicula	118, 324	<i>Barringtonia acutangula</i> L. Barringtoniaceae	Tree	W	Tropical America: Kalika <i>et al.</i> , 2019.
54.	Padma	51, 290	<i>Nelumbo nucifera</i> Gaertn. Nelumbonaceae	Herb	C	Mexico: Medakkar & Sharma, 2016.
55.	Panasa	20, 41, 48, 49, 56, 133	<i>Artocarpus heterophyllus</i> Lam. Moraceae	Tree	C	i) South-East Asia: Almeida, 2003. ii) Tahiti Islands: Mukhopadhyay & Chakraverty, 2008.

Sr. No. (1)	Sanskrit Name (2)	Verse No. (3)	Botanical Name & Family (4)	Habit (5)	Wild (W) / Cultigen(C) (6)	Nativity & Reference (7)
56.	Rasona	51	<i>Allium sativum</i> L. Liliaceae	Herb	C	Europe: Naik, 1998, Patil, 2003.
57.	Salmali	246	<i>Bombax ceiba</i> L. (Syn. <i>B.malabaricum</i> DC.) Bombaceae	Tree	W	i) Africa: Gaikwad & Garad, 2015. ii) Brazil To Argentina: Singh <i>et al.</i> , 2015.
58.	Sarvotobhadra	187	<i>Gmelina arborea</i> Roxb. Verbenaceae	Tree	C	Malaya: Medakkar & Sharma, 2016.
59.	Sephalika, Sinduvara	42, 154, 48, 49	<i>Vitex negundo</i> Linn. Verbenaceae	Shrub	W	North China & Mongolia: Bailey, 1949.
60.	Sirisa	92, 321	<i>Albizia lebbek</i> (L.) Bth. Mimosaceae	Tree	C	i) Pantropical Africa & Tropical Asia: Bhandari, 1978.
61.	Sobhanjana	42	<i>Moringa oleifera</i> Lam. Moringaceae	Tree	C	America: Singh & Srivastava, 2000.
62.	Utpala	51, 289, 290, 295	<i>Nymphaea nouchali</i> Burm. f. (Syn. <i>N.stellata</i> Willd.) Nymphaeaceae	Herb	W	South-East Asia: Shetty & Singh, 1987.
63.	Varahi	230, 231	<i>Dioscorea bulbifera</i> L. Dioscoreaceae	Climber	W	Asia (Excl. India): Stewart, 1972.
64.	Godhuma	213, 321	<i>Triticum aestivum</i> L. Poaceae	Herb	C	Fertile Crescent: Singh & Nigam, 2017.

Sr. No. (1)	Sanskrit Name (2)	Verse No. (3)	Botanical Name & Family (4)	Habit (5)	Wild (W) / Cultigen(C) (6)	Nativity & Reference (7)
65.	--	116, 117, 127, 188, 194, 195, 196	<i>Synapis alba</i> L. Brassicaceae	Herb	C	i) Eurasia: Bailey, 1949. ii) Mediterranean Area: Novak, 1996.
66.	Yasti, Yastimadhuka	235, 237, 244, 137, 191	<i>Glycirhiza glabra</i> Linn. Papilionaceae	Herb	C	i) Pakistan & Afghanistan: Negi & Hajra, 2007. ii) Mediterranean Region & Europe: Katya <i>et al.</i> , 2014.
67.	Yava	126, 127, 135, 213, 215-217, 237, 238, 241, 242, 253, 259, 260, 254-258, 320, 321	<i>Hordeum vulgare</i> L. Poaceae	Herb	C	Europe & North America: Dar <i>et al.</i> , 2002.