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Bioinvasion In India Evidenced From Madanpala Nighantu

Patil D.A.

Post-Graduate Department of Botany
S.S.V.P.S's L.K.Dr.P.R.Ghogrey Science College, Dhule-424005
(Maharashtra)
(Former Professor & Principal)
E-mail: dapatil_10aug@yahoo.com

Abstract:

On account of rapid climate change, it is absolutely imperative knowing current status of biodiversity. After habitat destruction, bioinvasion is the second worst threat to native biodiversities, even it is thought now as biopollution. Researches to reveal exotic floral elements integrated in Indian biodiversity are geared up tremendously. The present author also engaged himself in such trend of research. An attempt is presently made to find out exotic plant species from gleanings of ancient Madanpala Nighantu (14th century AD) authored by Madanpala. A total of 60 exotic species are revealed pertaining to 56 genera and 28 angiospermic families. Of these, the dicotyledonous taxa played a considerable role in bioinvasion in India in ancient period (53 species, 53 genera and 25 families). However, the monocotyledonous ones have a little role on this line (07 species, 07 genera and 03 families). These turned out to be wild (26 species), cultigens (29 species) and some (03 species) which are either wild and also cultivated. The herbaceous floral elements (11 species) obviously have a major role in invading Indian landmass. They are hailed from both Old and New Worlds covering various continents, countries, islands and specific geographical regions. It is hoped that the information so accrued will be useful while implementing measures of management and conservation of biodiversity in India.

Key Words: Madanpala Nighantu, Bioinvasion, Exotic Plants, India.

Introduction:

Madanpala Nighantu, also called Madana Vinod Nighantu, is written by Madanpal during 14th century AD. He included total 13 classes of materials, apart from Misrak Varga in which no material is mentioned. Some new materials are said to be included in it. It is quite nearer to Samhita period and based on nearby Ayurvedic medicinal texts. It is helpful to solve the controversial plants. Basionyms and actions are the ways to find a species of controversial medicinal plant and thus find a space in the field of ancient pharmacology.

Methodology:

To draw information about plant-wealth, the literary sources used are: (i) Madanpala Nighantu of Acharya Madanpala (1st Ed.) by Sastry J.L.N. (2010) and (ii) Madanpala Nighantu edited by Pandit Ramprasad (1990). The Sanskrit plants names are equated with the valid botanical names (in Latin). They are also assigned to their respective families. Information regarding habit and status (wild or cultivated) is also recorded. Nativities of each species mentioned against each species after consulting relevant taxonomic literature. The data so obtained is used to interpret bioinvasion in India which is, in turn, will be useful for biodiversity management and conservation.

Results & Discussion:

Mankind in his primitive phase of life while inhabiting, thick forests, difficult terrains and harsh environment would have suffered from many afflictions of diseases. He was thus perforce been tried to search out remedies from ambient nature. He would have tried by trial and errors some plant parts or products to gent freed from his sufferings. After food, medicine is his first discovery. Discovery of medicine become traditional and natural and emerged from the mist of time and hearts of many. It was also intermingled in early period with some beliefs, myths, legends and hymns. Gradually, it is isolated from these forces and rendered more scientific and rational. The Indian history of medicinal system is traced back to Ayurveda which is initiated since Vedic period. It then went through Samhita period and reached Nighantu period. Present author attempting to find out elements and evidences of bioinvasion in ancient Indian scriptures. The present attempt is to scrutinize an old 14th century AD Madanpala Nighantu composed by Mandapala.

Madanpal (13th-14th century AD.) authored Madanpala Nighantu (also called Madan Vinod). It is examined to point out exotic floral elements which invaded prior to the composition of this ancient lexicon. After consulting relevant taxonomic literary sources, the present author could earmark a total 60 exotic plant species invading in Indian territory in the said centuries. These belong to total 56 genera and 28 angiospermic families. They can be further categorized as dicotyledons and monocotyledons. The former are represented by 53 exotic plant species pertaining to 53 genera and 25 families of angiosperms. The latter ones have played a little role in bioinvasion in India relatively. They shared by 07 species, 07 genera and 03 families. They are either wild (28 species) or cultivated (29 species), apart from 03 plant species which is wild as well as a cultigen in India. The cultigens obviously added in Indian economy and human sustenance. They are useful, apart from medicinal purpose, as narcotics, fibre-yielders, spices and condiments, vegetable, ornamental, shade trees, aromatics and religious purposes. The wild exotic taxa have been integrated, during the course of time, with Indian biodiversity. They belong to different habital categories such as trees (09), shrubs (08), climbers (03) and herbs (40). The figures in parenthesis denote number of alien species invaded in Indian landmass. Although this Nighantu mainly informs about medicinal sources, some of them species are also useful form various human needs.

These plant taxa exhibited various biogeographical affiliations or nativities belonging to Old as well as New Worlds. They pertain to different continents, countries, specific geographical regions or islands such as: America, Africa, Asia (Excl. India), Europe and Australia. Other countries or regions also contributed either 02

exotic species e.g. Mediterrabnean Region, China, whereas other regions or countries shared a single species each e.g. Malaya, Brazil, Argentina, West Indies, Japan, Indonesia, Persia, Afro-Asian, Caspian sea Region and Caucasus mountains.

Plant invasion is age-old natural phenomenon. Plants disperse naturally because of their some adaptive morphological features. This helped to invade some regions of the world. Secondly, because of increased movement of mankind and his daily life necessities, he selected some plant species to sustain his life in a better way and thus brought them in his homeland. Plant invasion is thus natural and intentional. Some would have also invaded on account of human negligence during his various activities. Because of rapid climate change, it has become essential to know the current status of biodiversity. The exotic plant species play an important role altering native environment. The information obtained by this communication will help to think about biodiversity management and conservation.

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Table-I: Exotic Plant Species In Madanpala Nighantu

Sr. No. (1)	Sanskrit Plant Name (2)	Botanical Name & Family (3)	Cultivated (C)/ Wild (W) (4)	Habit (5)	Nativity & Reference (6)
1.	Bhanga	*Cannabis sativa* Linn. Cannabinaceae	W	Herb	(i) Central Asia: Chandra Sekar, 2012. (ii) Caspian Sea Region & Caucasus Mountains: Watt, 1908; Patil, 2019.
2.	Bringraj	*Eclipta prostrata* (L.) Linn. Asteraceae	W	Herb	South & Tropical America: Patil, 1990; Reddy, 2008; Chandra Sekar, 2012.
3.	Gambhari	*Gmelina arborea* Roxb. Verbenaceae	C	Tree	Malaysia: Medakkar & Sharma, 2016.
4.	Kakmachi	*Solanum nigrum* Linn. Solanaceae	W	Herb	(i) Tropical America: Debnath & Debnath, 2017; Chandra Sekar, 2012. (ii) Europe & America: Almeida, 2001.
5.	Kumari	*Aloe vera* (L.) Burm. *f.* Liliaceae	C	Herb	(i) North America: Patil, 2003; Naik, 1998. (ii) America: Yedav & Sardesai, 2002. (iii) Mediterranean Region: Bailey, 1949.
6.	Lahsun	*Allium sativum* Linn. Liliaceae	C	Herb	(i) Europe: Naik, 1998; Patil, 2003. (ii) Central Asia: Shah, 2014.
7.	Ngbala	*Sida cordata* (Burm. *f.*) Borss. Malvaceae	W	Herb	(i) Asia (Excl. India): Sheikh & Dixit, 2017. (ii) South America: Naqshi *et al.*, 1988.
8.	Shalmali	*Bombax ceiba* L. [Syn.Salmalia malabarica (DC.) Schott. & Endl.] Bombacaceae	W	Tree	(i) America & Australia: Mukhopadhyay & Chakraverty, 2008. (ii) Brazil to Argentina: Singh *et al.*, 2015. (iii) Africa: Gaikwad & Garad, 2015.
9.	Varahi	*Dioscorea bulbifera* Linn. Dioscoreaceae	W	Climber	Asia (Excl. India): Stewart, 1972.

Sr. No. (1)	Sanskrit Plant Name (2)	Botanical Name & Family (3)	Cultivated (C)/ Wild (W) (4)	Habit (5)	Nativity & Reference (6)
10.	Vasuk-Shwet	*Trianthema portulacastrum* Linn. Aizoacee	W	Herb	Tropical America: Quereshi *et al.*, 20014.
11.	Aragwadha	*Cassia fistula* L. Caesalpiniaceae	C	Tree	(i) North America: Debnath & Debnath, 2017. (ii) Tropical Asia: Mukhopadhyay & Chakraverty, 2008. (iii) West Asia: Singh *et al.*, 2015.
12.	Kancanara	*Bauhinia variegata* L. Caesalpiniaceae	C	Tree	China: Debnath & Debnath, 2017.
13.	Mulaka	*Raphanus sativus* L. Brassicaceae	C	Herb	(i) Western Asia: Purseglove, 1968. (ii) China, Japan & West Asia: Voight, 1845. (iii) Europe: John, 1891.
14.	Agastya	*Sesbania grandiflora* (L.) Poir. Papilionaceae	C	Tree	Indonesia: Patil, 1995; Shetty & Singh, 1987.
15.	Punnasa	*Calophyllum inophyllum* L. Clusiaceae	W,C	Tree	(i) East Africa: Pullaiah & Rao, 2001. (ii) Tropical Asia: Mukhopadhyay & Chakrverty, 2008.
16.	Barbari	*Ocimum basilicum* L. Lamiaceae	C	Shrub	(i) Persia: Pullaiah & Rao, 2001. (ii) Afro-Asian: Patil, 2003.
17.	Mallika	*Jasminum sambac* (L.) Aiton Oleaceae	C	Shrub	Tropical Asia: John, 1891; Patil, 2024.
18.	Punarnava-Kshudra	*Boerhavia repens* var. *diffusa* (L.) Hook. Nyctaginaceae	W	Herb	(i) South Africa: Struwig & Siebert, 2013. (ii) Tropical Africa: Panda *et al.*, 2018.

Sr. No. (1)	Sanskrit Plant Name (2)	Botanical Name & Family (3)	Cultivated (C)/ Wild (W) (4)	Habit (5)	Nativity & Reference (6)
19.	Tulasi, Surasu, Gamya, Bahumanjari, Bhutaghi	*Ocimum tenuiflorum* L. (Syn.O.sanctum L.) Lamiaceae	C	Herb	North Coastal Belt of Mediterranean Region: Swamy, 1973.
20.	Eranda	*Ricinus communis* L. Euphorbiaceae	C	T	Tropical Africa: Yadav & Saidesai, 2002.
21.	Rakta Eranda	*Jatropha curcas* L. Ephorbiaceae	C	T	(i) Tropical America: Gaikwad & Garad, 2015. (ii) Tropical Africa: Yadav & Sardesai, 2002.
22.	Shatapuspa	*Anethum graveolens* L. Apiaceae	C	H	Europe: Patil, 2003; Yadav & Sardesai, 2002.
23.	Rakta Apamarga	*Pupalia lappacea* (L.) A.L. Juss. Amaranthaceae	W	H	(i) Afro-Asian: Naik, 1998. (ii) Africa: Yadav & Sardesai, 2002.
24.	Indravaruni	*Citrullus colocynthis* (L.) Schrad.	W	C	West Africa: Sainkhedia, 2016.
25.	Schunda	*Euphorbia antiquorum* L. Euphorbiaceae	C	S	Africa: Naik, 1998.
26.	Hemavha	*Euphorbia ligularia* Roxb. Euphorbiaceae	W	S	Africa: Naik, 1998.
27.	Aparijita	*Clitoria ternatea* L. Papilionaceae	W,C	C	Tropical America: Purseglove, 1968.
28.	Nirgundi	*Vitex negundo* L. Verbenaceae	W	S	North China & Mongolia: Bailey, 1949.
29.	Bala	*Sida cordifolia* L. Malvaceae	W	H	Tropical & Subtropical Regions of both Hemispheres: Bhandari, 1978.

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30.	Shahadeva	*Sida rhombifolia* L. Malvaceae	W	H	America: Singh *et al*., 2015.
31.	Vatapatri	*Kalanchoe pinnata* (Lamk.) Pers Crassulaceae	C	H	Tropical Africa: Yadav & Sardesai, 2002; Patil, 2003.
32.	Lajjalu	*Mimosa pudica* L. Mimosaceae	C	S	(i) South America: Ridley, 1930. (ii) Brazil: Shetty & Singh, 1987.
33.	Kukkuradru	*Blumea lacera* (Burm.*f*.) DC.	W	H	Tropical America: Debnath & Debnath, 2017.
34.	Mashaparni	*Teramnus labialis* (L.*f*.) Spreng. Papilionaceae	W	H	Pantropical: Singh & Srivastava, 2000.
35.	Durva	*Cynodon dactylon* (L.) Pers. Poaceae	W	H	Tropical Africa: Debnath & Debnath, 2017.
36.	Tayapippali	*Phyla nodiflora* (L.) Greene Verbenaceae	W	H	South America: Stewart, 1972.
37.	Gandadurva	*Alternanthera sessilis* (L.) R.Br. Amaranthaceae	W	H	(i) Central America: Panda *et al*., 2018. (ii) Tropical America: Chandra Sekar, 2012.
38.	Mishreya, Madhurika	*Foeniculum vulgare* Mill. Apiaceae	C	H	South Europe: Shetty & Singh, 1987.
39.	Ajmoda	*Apium graveolens* L. Apiaceae	C	H	(i) Europe: Debnath & Debnath, 2017. (ii) Mediterranean Region: Purseglove, 1968.
40.	Jeeraka	*Cuminum cyminum* L. Apiaceae	C	H	(i) South Europe: Yadav & Sardesai, 2002. (ii) Mediterranean Region: Shetty & Singh, 1987; Patil, 1995.

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41.	Kalounji	*Nigella sativa* L. Ranunculaceae	W,C	H	(i) Eastern Mediterranean Region (Levant): Deb, 1983. (ii) Europe: Bailey, 1949.
42.	Yavani	*Carum carvi* Linn. Apiaceae	C	H	North & Central Europe: Patil & Dhale, 2013.
43.	Ajagandha	*Trachyspermum ammi* (L.) Sprague Apiaceae	C	H	(i) South Europe: Yadav & Sardesai, 2002. (ii) Africa: Patil, 1995.
44.	Parseeka Yavani	*Hyocyamus niger* L. Solanaceae	C	H	Southern England & South-East Ireland: Novak, 1966.
45.	Hingu	*Ferula assafoetida* L. Apiaceae	W	H	Central Asia, Europe, North Africa & Persia: Roxburgh, 1795-1820.
46.	Kubjaka	*Rosa moschata* Mill. Rosaceae	C	S	South Europe & North Africa: Bailey, 1949.
47.	Mahamundi	*Leonotis nepetifolia* (L.) R.Br. Lamiaceae	W	H	Tropical Africa: Reddy, 2008.
48.	Vaca	*Acorus calamus* Linn. Araceae	C	H	Southern Asia, Central & Western North America: Novak, 1966.
49.	Tanduliyah	*Amaranthus spinosus* Linn. Amaranthaceae	W	H	Tropical America: Patil, 1995; Chandra Sekar, 2012.
50.	Svanakshiri	*Argemone mexicana* L. Papaveraceae	W	H	(i) Tropical America: Shetty & Singh, 1987. (ii) South America: Chandra Sekar, 2012.

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51.	Kembukah, Kemukh	*Brassica oleracea* Linn. var. *capitata* L. Brassicaceae	C	H	Europe: Dar *et al*., 2002.
52.	Cakramardah	*Cassia tora* Linn. Caesalpiniaceae	W	H	South America: Reddy, 2008.
53.	Rohisah, Dhyamakah	*Cymbopogon martini* (Roxb.) Wats. Poaceae	C	H	(i) Afro-Asian: Naik, 1998. (ii) Africa: Yadav & Sardesai, 2002.
54.	Garjarah	*Daucus carota* Linn. Apiaceae	C	H	(i) Europe: Patil, 2003. (ii) Europe & North Africa: Shetty & Singh, 1987.
55.	Yastimaduh, Madhukah	*Glucyrrhiza glabra* Linn. Papilionaceae	C	S	Arabia, Persian Gulf, Afghanistan, Turkestan, Asia Minor & Siberia: Sawant *et al*., 2016.
56.	Yavah	*Hardeum vulgare* Linn. Poaceae	C	H	Europe & North America: Dar *et al*., 2002.
57.	Masurah	*Lens culinaris* Medic. Papilionaceae	C	H	Mediterranean Region & West Asia: Shetty & Singh, 1987.
58.	Dhamanakah	*Artemisia nilagirica* (C.B.Cl.) Pamp. Asteraceae	W	S	(i) Mediterranean Region of Francis & Croatia: Singh *et al*., 2015. (ii) America: Singh & Nigam, 2015.
59.	Balaka	*Abutilon indicum* (L.) Sweet Malvaceae	W	S	Africa: Thakur & Ambrish, 2023.

Sr. No. (1)	Sanskrit Plant Name (2)	Botanical Name & Family (3)	Cultivated (C)/ Wild (W) (4)	Habit (5)	Nativity & Reference (6)
60.	Vivaturah, Vellantarah	*Dichrostachys cinerea* (Linn.) Wight & Arn. Mimosaceae	W	T	Congo: Negi & Hajra,.