



## Fleming's catalogue in perspective of alien plant invasion in India and their source regions

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### Abstract

The present study deals with alien plants as revealed from Fleming's Catalogue on medicinal plants with background information, family, correct identities of species included, habit, status w.r.t. cultivation and naturalisation, besides their nativity. A total of 47 alien species belonging to 42 genera and 26 families of angiosperms are divulged. Majority of them are cultigens and herbaceous. American continent contributed maximum number of aliens in India. Other continents viz., Africa, Europe, Asia (Excl. India) contributed fairly. All these have obviously supported Indian medicinal system, besides their role in agriculture and forestry. Gleanings from past catalogues, scripts and treatises are helpful for clues and evidences of past plant invasion in a region. It is, therefore, important to re-study such literary sources.

**Keywords:** Fleming's catalogue, aliens, plant invasion, India

### Introduction

John Fleming was appointed as a surgeon on the Bengal Establishment (India). Fleming (1810) [10] while preparing this catalogue intended chiefly for the use of gentleman of the medical profession on their first arrival in India, to whom it must be desirable to know what articles of the *Materia medica* this country (India) affords and by what names they may find them. For correct Hindustani and Sanskrit names, he was assisted by Mr. Colebrooke as he was thorough acquainted with the oriental literature and his knowledge of botany. For virtues and uses of medicinal plants and drugs well known in Europe, he judged and referred to works viz., (i) Murray's 'Apparatus Medicaminum' and (ii) Woodvilles 'Medical Botany'. He also made further inquiry. His catalogue included both indigenous and exotic species without ascertaining as such as presented in total 61 pages, besides one Appendix (page 62 to 72) and Index to Latin plant names arranged alphabetically. This catalogue was printed at the The Hindustani Press, Calcutta (India) in 1810. Originally, this catalogue formed an article in the 11<sup>th</sup> Volume of the Asiatic Research.

The present author has gone critically through this catalogue to reveal the state of art regarding alien plant species in those days on Indian landmass. The Latin names are updated and their respective family is assigned. The plant species are provided in the Table-I highlighting their native status by consulting relevant taxonomic literature. The references are mentioned against each species. This study is aimed at plant invasion in the then India. The subject matter is discussed after critical analysis of each species included in this paper.

### Methodology

The catalogue runs for total 61 pages, apart from an appendix and index to Latin plant names. The information given by Fleming (1810) [10] is carefully investigated to earmark exotic plant species. The Indian common names are as those given by him. The recent botanical names, respective family, common names and nativity along with

relevant references for each species is provided in the Table-I. Authority of a botanical name if missing in original source, it is added. In other cases, new valid names are assigned. The original is also mentioned beneath it. The data is scrutinized in view of plant invasion in Indian territory prior to the publication of this catalogue.

### Results

The present analysis of alien plant taxa on Indian territory is based on the gleanings from Fleming's Catalogue (1810) [10] which particularly included medicinal plants. These are enumerated in the Table-I with their correct valid botanical names, Sanskrit name mentioned by Fleming, nativity of each species deciphered by close scrutiny of relevant taxonomic literature, besides their habit group and status regarding wildness or cultivation in India and in even outside. As many as 47 plant species belonging to 42 genera and 26 families of angiosperms are evaluated as aliens on Indian landmass. Of these, the majority of taxa are dicotyledons (44 species, 40 genera and 25 families). However, the monocotyledons are represented by a few taxa (03 species, 02 genera and a single family viz., Liliaceae). Majority of them are found under cultivation (31 species). Some species run wild (13 species), whereas only two species are either wild or cultivated. A single species viz., *Smilax china* L. is mostly sold as a drug in the Indian markets (Table-I). Majority of aliens are herbaceous (26 species) and the perennial ones are either trees (12 species) or shrubs (04 species). The lianas or climbers recorded are few (05 species). These alien taxa not only support medicinal systems, but have been resources for edible fruits, timber, edible oils, spices, narcotics and ornamentals.

### Discussion

All these aliens belong to various continents, geographical regions or countries of both Old and New Worlds. The present analysis revealed highest number of aliens from various parts of America (15 aliens). The other continents or geographical regions also contributed fairly e.g. Africa, Europe and Mediterranean region (07 aliens each), while

Asia (Excl. India) is represented by 05 alien taxa. Other countries or regions represent by just a single alien species viz., Malaysia, Afghanistan, Baluchistan, Persia, Japan, West Indies, Fertile Crescent, Middle East, Tropical and subtropical regions and Arabia, except China (02 aliens). Plants or animals have been transported from one region to another throughout the world since imemorable past. They are introduced either intentionally or unintentionally. In the former case, they are introduced deliberately for social or personal gains (Reddy, 2008) [42]. These many times established in the foreign habitat and even become an integral part of the local biodiversity. These are observed as such in Indian agricultural system (Singh and Nigam, 2017) [47] or even Indian system of medicine (Ayurveda) (Singh, 2016) [46]. The aliens in a region introduced due to human interference for various purposes are called 'anthropochores'. Some aliens, after their introduction in a new habitat may also die out. Such aliens are called 'casuals' (cf Patil, 2021) [34]. The alien taxa have been analysed particularly by Indian botanists from time to time at national level (Nayar, 1977; Maheshwari, 1960, 1979; Reddy, 2008; Yadav *et al.*, 2016) [19, 16, 17, 42, 57]. Some other geographical regions have been also examined from the point of plant invasion e.g. Uttar Pradesh (Singh *et al.*, 2010) [49], Kashmir Himalaya (Khuroo and Rashid, 2007) [15], Indian Himalayan Region (Chandra Sekar, 2012) [4] and Khandesh region in Maharashtra state (Patil, 2017) [23]. Plant invasion has been, of late, assessed by examining the

ancient Indian Sanskrit scripts and epics (Patil, 2017a,b; 2018a,b; 2019a,b,c; 2020; Patil and Patil, 2019) [22-33, 35]. Even the accounts published on Indian plants are analysed particularly during British regime in India (Patil, 2019c; 2020a,b,c) [28, 31, 32]. Plants invasion in India is also revealed through archaeobotanical evidences (Patil, 2020d). Present attempt is on the similar line of investigation with particular emphasis on plant invasion in India.

### Conclusions

The reasons of plant migration, introduction or establishment are varied. These are either transoceanic inter-continental movements of propagules (Sorenson and Johannessen, 2004; Singh *et al.*, 2011) [53, 48] or wind flow to great distances (Singh, 2016) [46].

Various mechanisms apart from anemochory e.g. zoochory, cheiropterphily, etc. are also responsible (Patil, 2020) [29]. However, plant invasions and their causes need a special enquiry.

It is but a fact that the earlier botanical annals and records inform on plant invasion and are sound evidence of this trend. Chatterjee (1947) [5] opined that introduction and naturalization of foreign plants dates back to the early Aryans who invaded Indian from countries in the north-west Eurasia. Present author lends supports to his viewpoint based on studies on the epics and scripts stated above. Many alien species supported Indian farming, forestry and medicinal systems on a large scale.

**Table 1:** Aliens Analysed from Catalogue by Fleming (1810) on Medicinal Plants

| Sr. no. 1 | Plant Name & family 2  | Common name 3   | Habit 4 | Wild (W) / cultivated (C) 5 | Nativity & reference 6   |
|-----------|--|---|---------|-----------------------------|--|
| 1.        | <i>Acacia nilotica</i> (L.) Willd. ex Del. spp. <i>indica</i> (Bth.) Brenan <i>Acacia Arabica</i> Mimosaceae | Babu (H)<br>Barbura (S)                               | Tree    | W                           | North Africa & Arab: Rajagopal & Panigrahi, 1965; [40] Purseglove, 1968 [39].  |
| 2.        | <i>Allium sativum</i> L. Liliaceae   | Lehsen (H)<br>Lasuna (S)                              | Herb    | C                           | Central Asia: Singh & Nigam, 2017 [47].<br>Europe: Yadav & Sardesai, 2002 [56].  |
| 3.        | <i>Aloe vera</i> (L.) Burm. f. <i>Aloe perfoliata</i> Liliaceae  | Ghi-Cumar (H)<br>Ghritha-Cumari (S)                   | Herb    | C                           | America: Yadav & Sardesai, 2002 [56].<br>North America: Patil, 2003 [21].  |
| 4.        | <i>Anethum graveolens</i> L. <i>Anethum sowa</i> Apiaceae  | Sowa (H)<br>Misreya (S)                               | Herb    | C                           | Europe: Patil & Dhale, 2013 [36];<br>Khuroo <i>et al.</i> . 2007 [15].   |
| 5.        | <i>Argemone mexicana</i> L. Papaveraceae   | Bherband (H)<br>Shial Canta (H)                       | Herb    | W                           | Tropical Central & South America: Reddy, 2008 [42].<br>Mexico: Central America & West Indies: Backer & Brink, 1963 [1];<br>Ridley, 1930. |
| 6.        | <i>Brassica campestris</i> Linn. var. <i>sarson</i> Prain Brassicaceae                                       | Serson (H)<br>Sarshapa (S)                            | Herb    | C                           | Europe: Naqshi & Javeid, 1987 [18].  |
| 7.        | <i>Brassica juncea</i> (Linn.) Czern. Brassicaceae   | Rajica  | Herb    | C                           | Middle East & Neighbouring Region: Prakash, 1980 [38].<br>Eastern Europe & China: Spect & Diederichsen, 2001 [54].                       |
| 8.        | <i>Caesalpinia bonduc</i> (L.) Roxb. <i>Caesalpinia bonducella</i> Caesalpiniceae                            | Catacaranja (H)<br>Cat-Caleji (H)<br>Puti-Caranja (S) | Lianes  | W                           | North America: Debnath & Debnath, 2017 [8].  |
| 9.        | <i>Cannabis sativa</i> L. Cannabinaceae  | Bhang (H)<br>Ganja (S)                                | Herb    | W                           | Western & Central Asia: Singh, 2016.<br>Central Asia: Chandra Sekar, 2012 [4].<br>Asia (Excl. India): Kaul, 1986 [14].                   |
| 10.       | <i>Capsicum annum</i> L. var. <i>annuum</i> Solanaceae   |   | Shrub   | C                           | South America: Singh & Nigam, 2017 [47].<br>Tropical America: Singh <i>et al.</i> ., 2001 [57].  |
| 11.       | <i>Capsicum frutescens</i> L. Solanaceae   | Lal Mirch (H)   | Shrub   | C                           | Tropical America: Yadav & Sardesai, 2002 [56].<br>Central & South America: Bailey, 1949 [2].   |
| 12.       | <i>Carica papaya</i> L.  | Papaya (H)  | Tree    | C                           | Tropical America: Singh <i>et al.</i> ., 2001;   |

|     | Caricaceae  |                                    |         |     | Yadav & Sardesai, 2002 [56].  |
|-----|---|------------------------------------|---------|-----|---|
| 13. | <i>Cassia alata</i> L.<br>Caesalpiniaceae   | Dad-merden (H)<br>Dadrughna (S)    | Shrub   | W   | West Indies: Reddy, 2008 [42]; Singh, <i>et al.</i> 2020.   |
| 14. | <i>Cassia fistula</i> L.<br>Caesalpiniaceae   | Ameltas (H)<br>Suvernaca (S)       | Tree    | C   | North America: Debnath & Denath, 2017 [8].  |
| 15. | <i>Cinnamomum camphora</i> (L.) Nees & Eberm.<br>Laurus camphora Lauraceae                  | Cafur (H)<br>Carphura (S)          | Tree    | C   | Japan: Gamble, 1957 [12].   |
| 16. | <i>Citrus medica</i> L. Rutaceae  | Lemu (H)<br>Jambira (S)            | Tree    | C   | China: Roxburgh, 1814 [14].   |
| 17. | <i>Coriandrum sativum</i> L. Apiaceae   | Dhanya (H)<br>Dhanyaca (S)         | Herb    | C   | Europe: Khuroo <i>et al.</i> , 2007 [15].<br>South Europe: Yadav & Sardesai, 2002 [56].   |
| 18. | <i>Cuminum cyminum</i> L. Apiaceae  | Jira (H)<br>Jiraca (S)             | Herb    | C   | South Europe: Yadav & Sardesai, 2002 [56].  |
| 19. | <i>Datura fastuosa</i> L. Solanaceae  | Lal Dhatura (H)                    | Herb    | W   | South America & Mexico: Chandra Sekar, 2012 [4].  |
| 20. | <i>Datura metel</i> L.<br>Solanaceae  | Dhatura (H)<br>Dhustura (S)        | Herb    | W   | Tropical America: Reddy, 2008 [42].<br>Srivastava, 1964; Patil, 1990 [20];<br>Singh <i>et al.</i> , 2010 [49]; Chandra Sekar, 2012 [4]. |
| 21. | <i>Daucus carota</i> L.<br>Apiaceae   | Gajer (H)<br>Gajara (S)            | Herb    | C   | Africa & Europe: Khuroo <i>et al.</i> , 2007 [15].<br>Europe: Yadav & Sardesai, 2002 [56];<br>Gaikwad & Gard, 2015.                     |
| 22. | <i>Eupatorium triplinerve</i> Vahl.<br><i>Eupatorium ayapana</i> Asteraceae                 |                                    | Herb    | C   | Tropical America: Cooke, 1958 [6].  |
| 23. | <i>Ferula assafoetida</i> L. <i>Ferula assafoetida</i> Apiaceae                             | Hing (H)<br>Hinga (S)              | Herb    | W   | Central Asia, Europe & North Africa: Patil & Dhale, 2013 [36].  |
| 24. | <i>Glycyrrhiza glabra</i> L.<br>Papilionaceae   | Jethimadh (H)<br>Yastimadhuca (S)  | Climber | W,C | Mediterranean Region: Katya <i>et al.</i> , 2014 [13].  |
| 25. | <i>Jatropha curcas</i> L. Euphorbiaceae   | Bagbarinda (H)                     | Tree    | C   | Tropical Africa: Yadav & Sardesai, 2002 [56]; Gaikad & Garad, 2015.   |
| 26. | <i>Linum usitatissimum</i> L. Linaceae  | Tisi (H)<br>Atasi (S)              | Herb    | C   | Fertile Crescent (Georgia): Singh & Nigam, 2017 [47].<br>Mediterranean Region: De Candolle, 1959 [7].                                   |
| 27. | <i>Melaleuca leucodendron</i> (L.) L.<br><i>Melaleuca cajuputi</i> Myrtaceae                |                                    | Tree    | C   | Malaysia: Purseglove, 1968 [39].  |
| 28. | <i>Melia azadirach</i> L. Meliaceae   | Nimb (H)<br>Nimba (S)              | Tree    | C   | Asia (Excl. India): Khuroo <i>et al.</i> , 2007.  |
| 29. | <i>Metha arvensis</i> L. <i>Mentha sativa</i> Lamiaceae                                     | Podina (H)                         | Herb    | C   | Africa & Europe: Reshi, 1984.   |
| 30. | <i>Mirabilis jalapa</i> L. Nyctaginaceae  | Gul Abbas (H)                      | Herb    | C   | Mexico: Singh <i>et al.</i> , 201.<br>Gaikwad & Garad, 2015.<br>South America: Patil, 2003.   |
| 31. | <i>Mucuna pruriens</i> (L.) DC. <i>Dolichos pruriens</i> Papilionaceae                      | Kiwach (H)<br>Capicachhu (S)       | Climber | W   | America: Singh & Nigam, 2017 [47].  |
| 32. | <i>Myristica fragrance</i> Houtt.<br>Myristicaceae  | Mace<br>Nutmeg                     | Tree    | C   | Moluccas: Singh <i>et al.</i> , 2001.   |
| 33. | <i>Nicotiana tobacum</i> L. Solanaceae  | Tambacu (H)<br>Tambacuta (S)       | Herb    | C   | America: Singh, 2016 [46]; Singh & Nigam, 2017 [47]; Bailey, 1949 [2];<br>Purseglove, 1968 [39].  |
| 34. | <i>Nigella sativa</i> var. <i>indica</i> (Roxb.) DC.<br><i>Nigella indica</i> Ranunculaceae | Cala jira (H)<br>Musavi (S)        | Herb    | C   | Levant (Eastern Mediterranean Region): Patil & Dhale, 2013 [36].  |
| 35. | <i>Papaver somniferum</i> L. Papaveraceae   | Post (H)<br>Afiun (H)<br>Chasa (S) | Herb    | C   | Western Mediterranean Region of Europe: Singh, 2016 [46].<br>Europe: Stewart, 1972 [55]; Khuroo <i>et al.</i> , 2007.                   |
| 36. | <i>Pimpinella anisum</i> L. Apiaceae  | Saunf (H)<br>Satapushpa (S)        | Herb    | C   | Mediterranean Region: Patil & Dhale, 2013 [36].   |
| 37. | <i>Plumbago zeylanica</i> L.<br>Plumbaginaceae  | Chita (H)<br>Chitraca (S)          | Shrub   | W   | Africa: Rajagopal & Panigrahi, 1965 [40].   |
| 38. | <i>Punica granatum</i> L. Punicaceae  | Anar (H)<br>Dadima (S)             | Tree    | C   | Afghanistan, Baluchistan & Persia: De Candolle, 1959 [7].<br>Afghanistan & Persia: Patil, 2003 [21].                                    |
| 39. | <i>Ricinus communis</i> L. Euphorbiaceae  | Arendi (H)<br>Eranda (S)           | Tree    | C   | West-Central Africa: Singh & Nigam, 2017 [47].<br>Tropical Africa: Yadav & Sardesai, 2002 [56].   |

|     |  |                              |         |                |   |
|-----|--|------------------------------|---------|----------------|---|
| 40. | <i>Rubia cordifolia</i> L. <i>Rubia manjih</i><br>Rubiaceae          | Manjith (H)<br>Manjstha (S)  | Climber | W              | Asia (Excl.India) & Africa: Khurro <i>et al.</i> , 2007; Kaul, 1986 <sup>[14]</sup> .   |
| 41. | <i>Ruta chalenpeasis</i> L. <i>Ruta graveolens</i><br>Rutaceae       | Saturi (H)                   | Herb    | C              | Mediterranean Region: Singh <i>et al.</i> , 2000; Bailey, 1949 <sup>[2]</sup> ; Purseglove, 1968 <sup>[39]</sup> .  |
| 42. | <i>Sida cordifolia</i> l. Malvaceae                                  | Bariala (H)<br>Batyulaka (S) | Hetb    | W              | Tropical & Subtropical Regons of Both Hemispheres: Bhandari, 1978 <sup>[3]</sup> ; Cooke, 1958 <sup>[6]</sup> .   |
| 43. | <i>Sida rhombifolia</i> L. Malvaceae                                 | Lal Bariala (H)              | Herb    | W              | America: Singh & Das, 2015 <sup>[2]</sup> .   |
| 44. | <i>Smilax china</i> L. Liliaceae                                     | Chob Chini (H)               | Climber | Sold in Market | China: Desai, 1975 <sup>[9]</sup> .<br>China & Japan: Pereram, 2014.  |
| 45. | <i>Tamarindus indica</i> L. Caesalpinaceae                           | Amla (H)<br>Amla (S)         | Tree    | W,C            | Tropical Africa: Singh & Nigam, 2017 <sup>[47]</sup> ; Purseglove, 1968 <sup>[39]</sup> .<br>Tropical America: Shetty & Singh, 1987 <sup>[44]</sup> ; Patil, 1990 <sup>[20]</sup> . |
| 46. | <i>Trachyspermum ammi</i> (L.) Sprague<br><i>Apium involucreatum</i> | Ajmod (H)<br>Ajmoda (S)      | Herb    | C              | Southern Europe: Gaikwad & Garad, 2015.   |
| 47. | <i>Trigonella foenum-graecum</i> L.<br>Papilionaceae                 | Methi (H)<br>Methi (S)       | Herb    | C              | Mediterranean Region: Singh & Nigam, 2017 <sup>[47]</sup> .<br>Asia (Excl. India) & Europe: Khurro <i>et al.</i> , 2007.  |

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