



Documentation of Exotic Plants from Saraswati Degree Science College Campus and Adjoining Areas in Bhawanipatna, Kalahandi District, Odisha

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Abstract: In this present study we have documented the list of exotic plant species found from Saraswati Degree Science College Campus and adjoining areas in Bhawanipatna, Kalahandi district, Odisha with additional information on habit, origin and uses. During the study, a total of 25 exotic species belonging to 25 genera in 20 families were identified and listed. Among them 12 number of exotic species are native to Trop. America followed by Mexico with three species, Brazil with two species. Analysis of the habit shows that herbs having 17 (68%), followed by (05) 20% shrubs and (03) 12% trees. Among 20 families, Amaranthaceae is dominant family with three species followed by three families i.e. Asteraceae, Euphorbiaceae and Malvaceae with two species each, while rest 16 families contribute one species each. There is an urgent need to catalog the regional data on exotic species in order to study the impact on local vegetation.

Key words: Exotic species, nativity, Bhawanipatna, Kalahandi, Odisha.

I. INTRODUCTION

The invasive species were defined as an alien species which established in natural or semi-natural ecosystems or habitat and threatens to native biological diversity by the International Union for Conservation of Nature and Natural Resources. Throughout the world, a number of species were introduced accidentally through transportation for business purposes, human health care purpose and economic purposes (Ewell et. al 1999). These introduced plant species were known as exotic species. After well adapted to the new environment the exotic species occupy a great extend. They have the power to grow in any new environmental conditions and are easily invasive to the new environment. The Invasive alien plant species (IAPs) are grown in such a way that they become as more dangerous to sustainable development (Preston and Williams 2003). The exotic species act as a natural enemy because they provoke ecological changes, effects on yields, brushing limit (Mack et al. 2000); ecological danger to surrounding environments, the agricultural economy, human health also affects the biodiversity and to society (2020 and Kiran 2020). In present day many of the exotic species were cultivated for food, fuel, fodder or medicine purpose by the local communities (Roder et al. 2007). Further, these invasive plants affect the ecosystem functions, ecosystem processes, primary productivity, hydrology, geomorphology and biogeochemical cycle of an area (Sheikh and Dixit 2017). These exotic species do not split the native plant diversity but compete with the local community for the limited natural resources and alter the rule of survival for all species (Vitousek et al. 1997). The debris of these exotic plants decomposed very slowly as compare to those of the native

plant community (Rothstein et al. 2004, Sheikh and Dixit 2017). The exotic plant species creates severe problems to the ecosystems by changing the structure, composition, and function of natural ecosystem (Maslo 2016, Moktan and Das 2013, Mooney and Hobbs 2000). Furthermore, these exotic plants have rapid reproduction and growth rate, high dispersal ability, physiological adaptations to new conditions, and capability to survive on a variety of ecosystems. When the exotic plants colonized to grow in new areas, they can change the soil texture and composition of that area. According the report of Rao and Murugan (2006) the agricultural fields were more affected by these exotic plant species because they were introduced by the crop seeds, garden plants, and wind breakers. In order to proper management of these exotic species the collection of baseline data like their status, growth form and life cycle are the most important and primitive step. The distinguishing between the native and exotic species is essential for conservation and vegetation management plans but also for improving our understanding of the different components of biodiversity (Preston and Williams 2003).

The Saraswati Degree Science College, Bhawanipatna was established in the year 2012 in the name of Lord Goddess Saraswati. Now this college is managed by Vikash Group of Institutions, Bargarh; one of the leading, well established, well known groups of Western Odisha. The student intake capacity of this college is 128 in nos. There are no previous studies conducted on floral diversity of this College campus and adjoining areas in Bhawanipatna. Documentation of biodiversity is an urgent requirement as latest statistics and data on floral biodiversity of India has not been compiled and documented. The knowledge about the ecosystem structure, composition and diversity of species helps to improve the protection of endemic species (Sahu et al. 2020).

II. MATERIALS AND METHOD

2.1 Study area and identification of plants

Kalahandi district lies in between 19.3 N and 21.5 N latitudes and 82.20 E and 83.47 E longitudes and occupies the south western portion of Odisha, bordered to the north by the Balangir district and Nuapada district, to the south by the Nabarangpur district, Koraput district and Rayagada district, and to the east by the Rayagada district, Kandhamal district and Boudh district. It has an area of 8,364.89 square kilometres and ranks seventh in area among the 30 districts of Odisha. Bhawanipatna is the district headquarters, which stands almost in the central location of the district. This district has two physiographic regions, i.e. the plain land and the hilly tracts. The hilly tracts are mostly located in the south-western part of Bhawanipatna Subdivision. Further, it is second largest city of South Odisha and district headquarters of the Kalahandi district in the Indian state of Odisha. Bhawanipatna is a city of numerous temples dedicated to different deities of Hindu pantheon. It is named after the presiding deity, Bhawani-Shankar and Patnam which means place in Odia like "Padaa". Bhawanipatna municipality is the administrative head of the city, which is divided into 20 wards with different sub-areas called *pada*. Originally, these *padaas* were inhabited by people of different communities, but over the last few decades, these padas have become homogeneous. Bhawanipatna has more than 45 padas. It is one of the biggest urban areas of southern part of Odisha (Figure 1a). A large section of rural population and different tribal people stay in this district. *Kandha*, *Ganda* and *Sabara* are some of the dominate tribes of this region (Sahu et al. 2020). The present exotic floral study was conducted in and around the Saraswati Degree Science College Campus and adjoining areas in Bhawanipatna (Figure 1b). The herbal plants were represented alphabetically according to their scientific names, family, habit, nativity, and uses. For identification of plants local flora books were used (Saxena and Brahmam 1994-96) and for local name previous published reports have been used (Sahu et al. 2010, Sahu et al. 2013) and for nativities previous published literatures were used (Heywood 1989, Lal et al. 2012, Maslo 2016, Reddy et al. 2008, Sekar et al. 2012, Sahu and Ekka 2020).

III. RESULTS AND DISCUSSION

In this present study a total of 25 exotic species belonging to 25 genera in 20 families were identified and listed. The habit of the plants was observed to be annual or perennial. The nativities of the exotic species shown are from different countries of the world. The uses of these exotic plants were categories as food, fodder, fuel, vegetable, ornamental, medicine, noxious etc. by interviewing the native peoples and also using the available literature (Table 1). Among 20 families, Amaranthaceae is dominant family with three species (12%) followed by three families i.e. Asteraceae, Euphorbiaceae and Malvaceae with two species (8%) each, while rest 16 families contribute one species (4%) each (Table 2, Figure 2). Among 25 exotic plants, 12 number of exotic species are native to Trop. America followed by Mexico with three species, Brazil with two species, rest Africa, America, China, Madagascar, Mediterranean, S. America (1824), S. America (17th cent.), West Indies are native to one species each (Figure 3). The habits of the exotic species are showing interesting results i.e. herbs having 17 (68%), followed by (05) 20% shrubs and (03) 12% trees (Table 1). All the exotic species are away from their place of origin and play an important role in the life of human beings. In this present study we found that a total of 20 species (57%) were used as medicine, four species (11%) were used as ornamental purpose, followed by three species (8%) each as noxious and vegetables, while two species (8%) each as fuel and Unintentional, and one species (3%) as fruit plants (Table 3, Figure 4).

In this present manuscript we had documented a total of 25 exotic plants (25 genera) in 20 families from Saraswati Degree Science College Campus and adjoining areas in Bhawanipatna, Kalahandi district, Odisha. These species have been further classified into naturalized and noxious by various authors (Maslo 2016, Sheikh and Dixit 2017, Singh et al. 2010, Sahu and Ekka 2020). Three noxious species viz. *Argemone mexicana* L., *Cassia tora* L. and *Lantana camara* L. were found in this study area. From the taxonomical study, Amaranthaceae was the most dominant exotic family which dominated all other species due to its adaptive nature of seeds in different areas. The plant species have high reproductive potential to produce minute seeds so fast which disperse in new area through air, water and wind. A total of 131 invasive alien plants species with 97 genera and under 39 different families were reported in Dhenkanal district of Odisha by Nayak and Satpathy 2015. Sahu and Ekka 2020 reported a checklist of 50 exotic herb s used by the peoples of Sambalpur district of Odisha. Sahu and Raal 2022 reported about 76 exotic plant species from 36 families in in Bargarh district, western Odisha, India.

Medicinal plants like *Argemone mexicana* L., *Calotropis procera* (Alt.) R. Br., *Carica papaya* L., *Cassia tora* L., *Catharanthus roseus* (Linn) G. Don, *Cuscuta reflexa* Roxb., *Cynodon dactylon* (L.) Pers., *Euphorbia hirta* L., *Hibiscus rosa-sinensis* L., *Jatropha gossypifolia* L., *Mimosa pudica* L., *Ocimum canum* Sims, *Scoparia dulcis* L., *Sida acuta* Burm.f., *Tagetes erecta* L., and *Tridax procumbens* L. were documented in the present report. Sahu et al. 2020 also reported *Acacia nilotica* (L.) Willd. as medicinal plants on traditional use of selected plants of fabaceae family at Bargarh district, Odisha. Sahu et al. 2020 described the ethnomedicinal use of *Acacia nilotica* (L.) Willd. and *Carica papaya* L. for oral care in Kalahandi district, Odisha. Sahu et al. 2021 reported about the ethnobotanical use of *Hibiscus rosa-sinensis* L. and *Sida acuta* Burm.f. in relieving urogenital ailments by the native of Bargarh district, Odisha. Rana et al. 2020 reported about the ethnomedicinal uses of *Cassia tora* L. and *Sida acuta* Burm.f. by the Gond tribal group of Amilipali village of Padampur NAC of Bargarh district in Western Odisha, India. Sahu and Sahu 2020 reported the ethnomedicinal uses of *Carica papaya* L., *Phoenix sylvestris* (L.) Roxb. and *Sida acuta* Burm.f. for dental care by the tribals of Bargarh district, western Odisha, India. Sahu et al. 2020 reported *Acacia nilotica* (L.) Willd., *Aerva lanata* (L.) Juss. ex. Schult., *Argemone mexicana* L., *Carica papaya* L., *Catharanthus roseus* (Linn) G. Don, *Cleome viscosa* L., *Cuscuta reflexa* Roxb., *Cynodon dactylon* (L.) Pers., *Euphorbia hirta* L., *Hibiscus rosa-sinensis* L., *Lantana camara* L., *Mimosa pudica* L., *Scoparia dulcis* L., *Sida acuta* Burm.f., *Tridax procumbens* as medicinal plants of Saraswati +3 Science College, Bhawanipatna Campus and its adjacent areas, Kalahandi district. The ethnomedicinal uses of *Argemone mexicana* L., *Carica papaya* L., *Cynodon dactylon* (L.) Pers., *Hibiscus rosa-sinensis* L., *Lantana camara* L., *Phoenix sylvestris* (L.) Roxb., and *Tridax procumbens* L. plants at Sohela Block, Bargarh district was reported by Sahu et al. 2013. Sahu et al. 2010 reported the ethnomedicinal uses of *Acacia nilotica* (L.) Willd., *Aerva lanata* (L.) Juss. ex. Schult., *Argemone mexicana* L., *Calotropis procera* (Alt.) R. Br., *Carica papaya* L., *Cassia tora* L., *Catharanthus roseus* (Linn) G. Don, *Cuscuta reflexa* Roxb., *Cynodon dactylon* (L.) Pers., *Euphorbia hirta* L.,

Hibiscus rosa-sinensis L., *Jatropha gossypifolia* L., *Lantana camara* L., *Martynia annua* L., *Mimosa pudica* L., *Phoenix sylvestris* (L.) Roxb., *Scoparia dulcis* L., *Sida acuta* Burm.f., *Tagetes erecta* L., and *Tridax procumbens* L. plants by native of Bargarh district.

IV. CONCLUSION

In this present paper we had documented about 25 exotic plants belong to 25 genera and 20 families from Saraswati Degree Science College Campus and adjoining areas in Bhawanipatna, Kalahandi district, Odisha. This is the first attempt to documentation of exotic plant species which will help us to understand their presence, distribution, reproduction. Present report provides us a better way to plan for early detection of exotic species and monitoring of them by the agriculturist, botanist, ecologist and taxonomist. One of the advantage of the present work is that majority of these exotic species have medicinal importance.

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Table 1 List of exotic plant species found in and around Saraswati Degree Science College Campus, Bhawanipatna, Kalahandi district of Western Odisha.

Sl. No.	Plant Species	Local name	Family	Life Form	Nativity	Uses
1	<i>Acacia nilotica</i> (L.) Willd.	Bamur	Fabaceae	Tree	Africa	M
2	<i>Aerva lanata</i> (L.) Juss. ex. Schult.	Pausia	Amaranthaceae	Herb	Madagascar	M
3	<i>Alternanthera sessilis</i> (Linn) DC.	Madranga	Amaranthaceae	Herb	Trop. America	M, V
4	<i>Argemone mexicana</i> L.	Dengbhejeri	Papaveraceae	Herb	S. America (17th cent.)	M, Nox
5	<i>Calotropis procera</i> (Alt.) R. Br.	Arakh	Asclepiadaceae	Shrub	Trop. America	M
6	<i>Carica papaya</i> L.	Amrutbhanda	Caricaceae	Tree	Maxico	M, V
7	<i>Cassia tora</i> L.	Sanchakunda	Caesalpiniaceae	Herb	S. America (1824)	M, Nox, V
8	<i>Catharanthus roseus</i> (Linn) G. Don	Baramasi	Apocynaceae	Herb	West Indies	M, O
9	<i>Cleome viscosa</i> L.	Bansurso	Capparaceae	Herb	Trop. America	Uni
10	<i>Cuscuta reflexa</i> Roxb.	Nirmuli	Cuscutaceae	Herb	Mediterranean	M
11	<i>Cynodon dactylon</i> (L.) Pers.	Dub lata	Poaceae	Herb	Trop. America	M
12	<i>Euphorbia hirta</i> L.	Chitakuti	Euphorbiaceae	Herb	Trop. America	M
13	<i>Gomphrena globosa</i> L.	Supariphul	Amaranthaceae	Herb	America	O
14	<i>Hibiscus rosa-sinensis</i> L.	Mandar	Malvaceae	Shrub	China	M, O
15	<i>Ipomoea carnea</i> Jacq.	Amari	Convolvulaceae	Shrub	Trop. America	Fu
16	<i>Jatropha gossypifolia</i> L.	Jada	Euphorbiaceae	Shrub	Brazil	M
17	<i>Lantana camara</i> L.	Kirkichi	Verbenaceae	Shrub	Trop. America	M, Nox
18	<i>Martynia annua</i> L.	Bagnakh	Pedaliaceae	Herb	Trop. America	Uni
19	<i>Mimosa pudica</i> L.	Lajkuli	Mimosaceae	Herb	Brazil	M
20	<i>Ocimum canum</i> Sims	Ban Tulsi	Lamiaceae	Herb	Trop. America	M
21	<i>Phoenix sylvestris</i> (L.) Roxb.	Khajur	Araceae	Tree	Trop. America	Ft, Fu
22	<i>Scoparia dulcis</i> L.	Banaengei	Scrophulariaceae	Herb	Trop. America	M
23	<i>Sida acuta</i> Burm.f.	Bajrmuli	Malvaceae	Herb	Trop. America	M
24	<i>Tagetes erecta</i> L.	Gendu	Asteraceae	Herb	Mexico	M, O
25	<i>Tridax procumbens</i> L.	Bisalyakarani	Asteraceae	Herb	Mexico	M

Note: Ft, fruit; O, ornamental; M, medicinal; Fu, fuel; Fib, fiber; V, vegetable; Nox, noxious; Uni, Unintentional

Table 2: Percentage of contribution of families among the recorded species

Name of the Family	No of Species	%age
Amaranthaceae	3	12
Apocynaceae	1	4
Araceae	1	4
Asclepiadaceae	1	4
Asteraceae	2	8
Caesalpiniaceae	1	4
Capparaceae	1	4
Caricaceae	1	4
Convolvulaceae	1	4
Cuscutaceae	1	4
Euphorbiaceae	2	8
Fabaceae	1	4
Lamiaceae	1	4
Malvaceae	2	8
Mimosaceae	1	4
Papaveraceae	1	4
Pedaliaceae	1	4
Poaceae	1	4
Scrophulariaceae	1	4
Verbenaceae	1	4

Table 3 Regions of Nativity of exotic plant species found in and around Saraswati Degree Science College Campus, Bhawanipatna, Kalahandi district of Western Odisha.

Region of Nativity	No. of Species	Contribution percentage
Africa	1	4
America	1	4
Brazil	2	8
China	1	4
Madagascar	1	4
Mediterranean	1	4
Mexico	3	12
S. America (1824)	1	4
S. America (17 th cent.)	1	4
Trop. America	12	48
West Indies	1	4

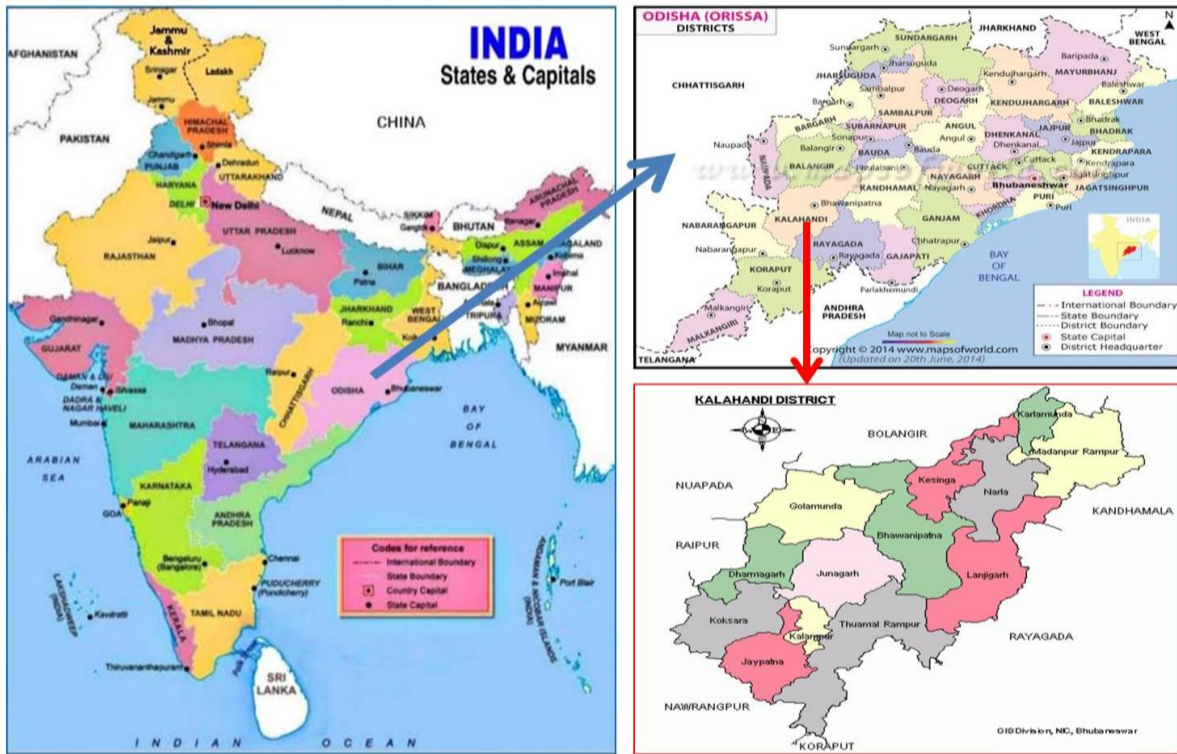


Figure 1a: Map showing the location of Kalahandi in the state of Odisha.

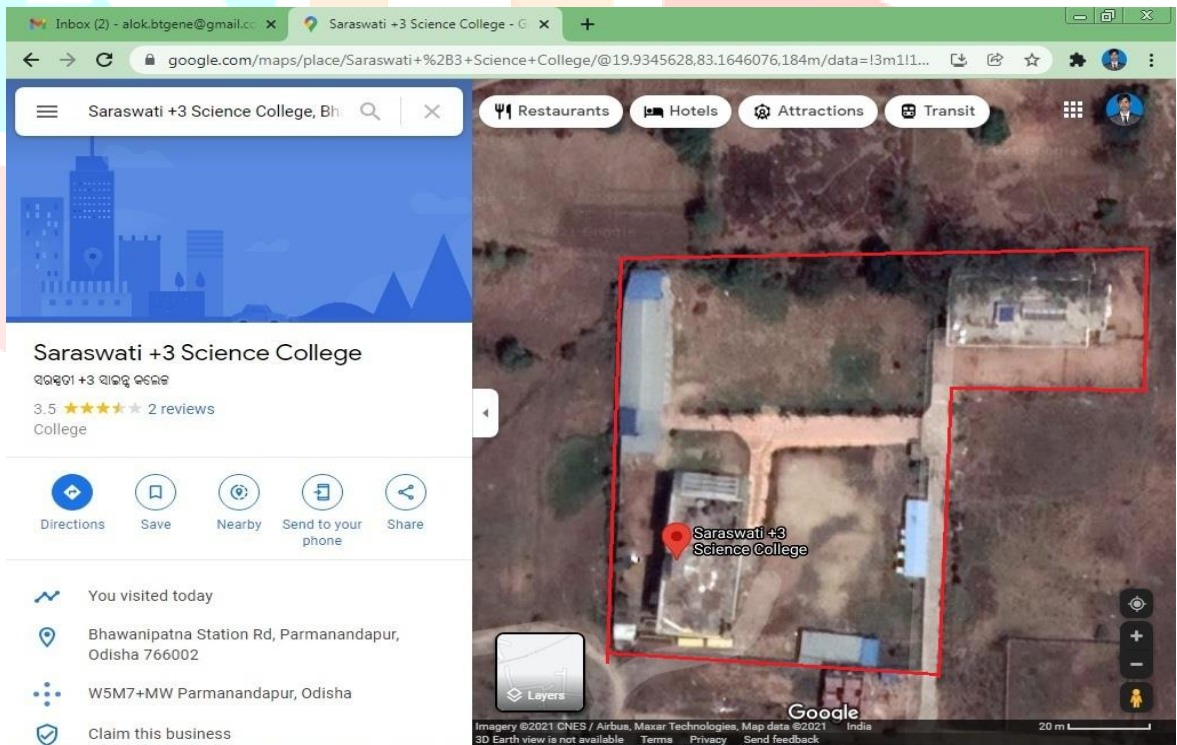


Figure 1b: Study Area (source: Google Maps).

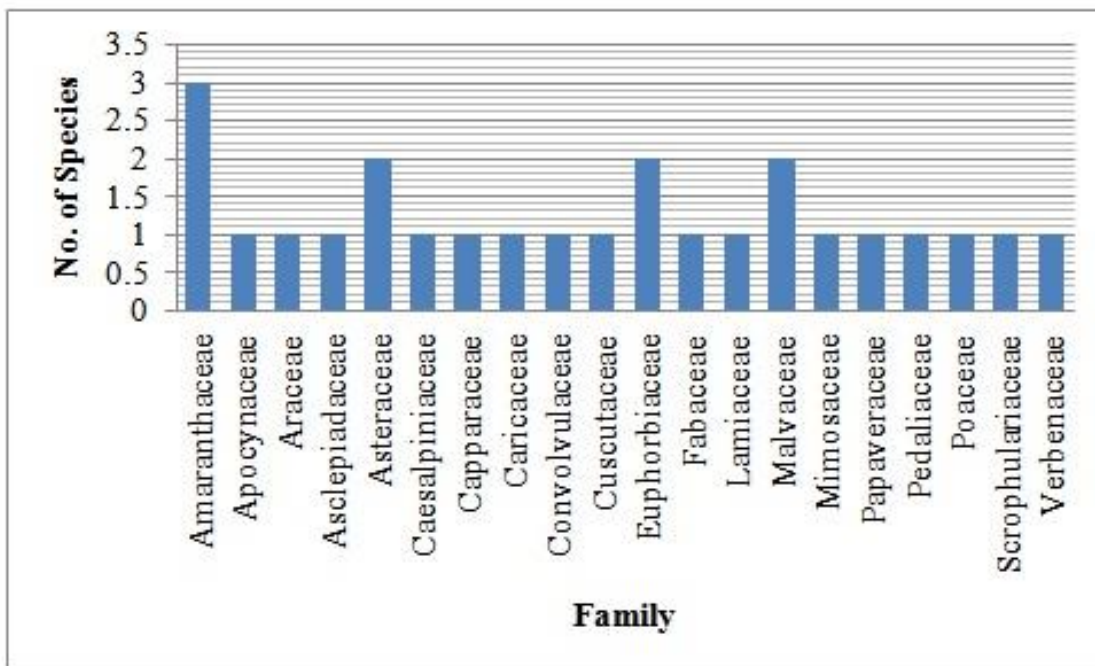


Figure 2: Family wise distribution of exotic plant species of the study area.

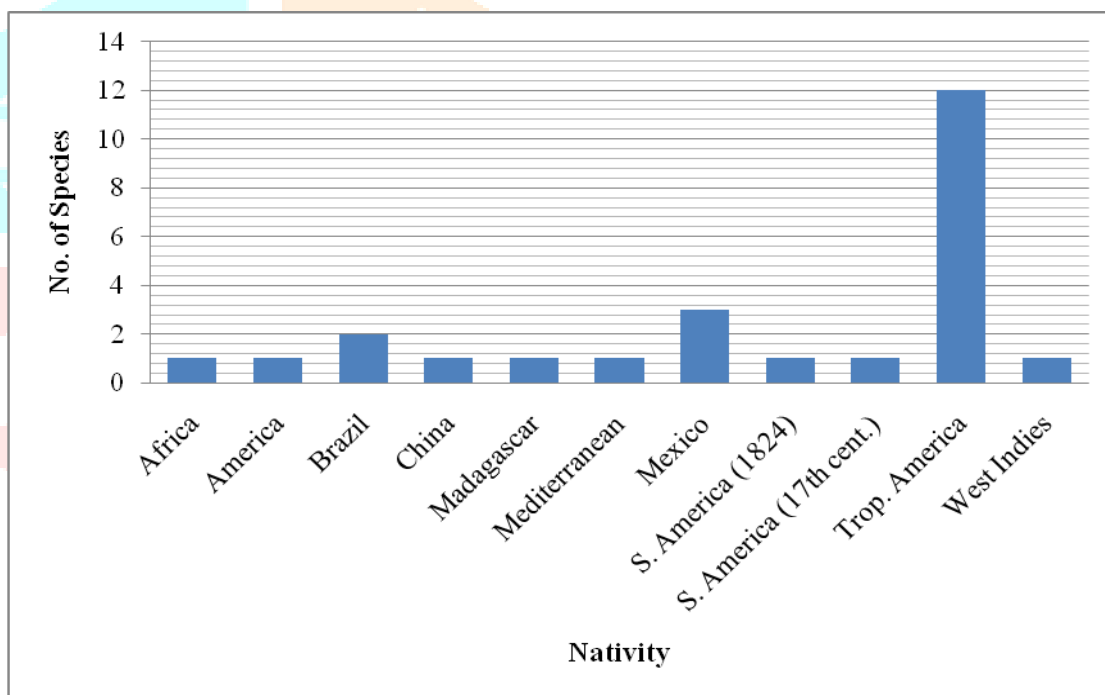


Figure 3: Contribution of countries from where the species have its origin.

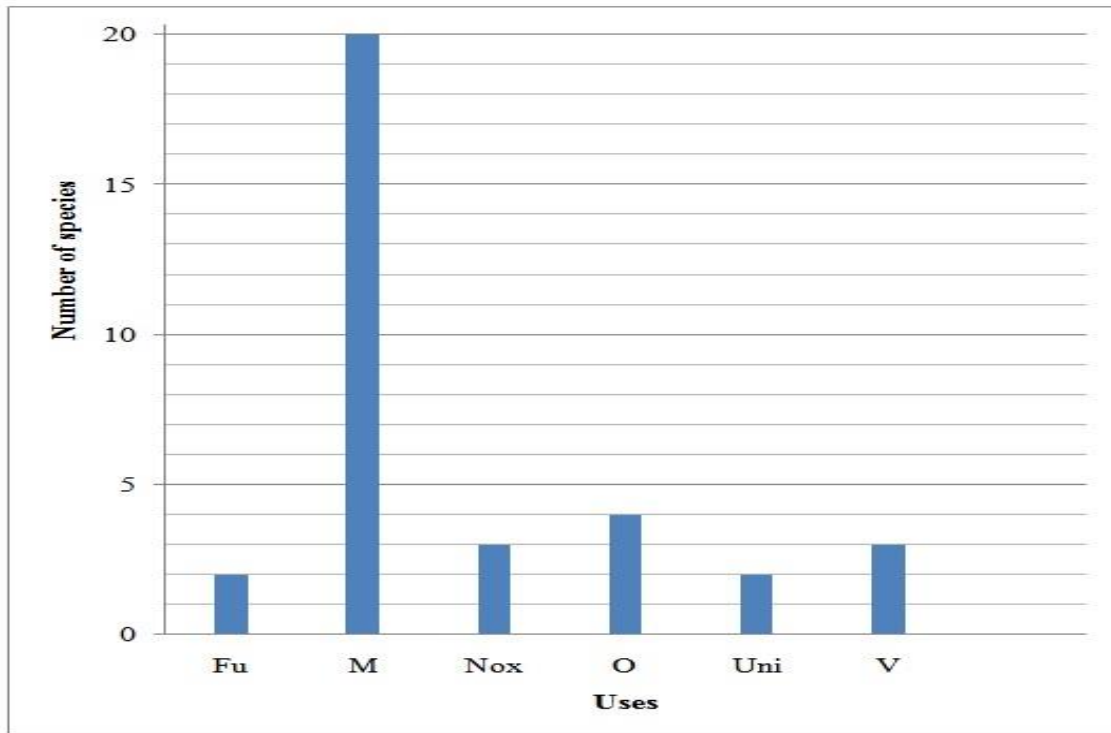


Figure 4: Contribution of exotic herbs for various uses.

