



ALIEN PLANTS IN THE SIKKIM HIMALAYA

D.K Pradhan

High Altitude Research -Quality Control Laboratory
Forest and Environment Department
Deorali, Gangtok, Sikkim, India 737102

Abstract

The study included the documentation of alien species of Sikkim indicating their sources. However the paper has not included impact assessment on ecosystem.

Keywords: Alien species, exotic species, Sikkim Himalaya.

Introduction

The flora of Sikkim Himalaya has additional species from the different natural sources which were bought and planted in this region for various reasons. The study focuses on the documentation of alien species of Sikkim. Some of the botanical specimens were travelled naturally which might be by natural contrivances and other for socio-economic development of regions.

The study has not included impact assessment but attempted to document the alien species. This enumeration of alien species is developed to have an understanding of species and it can be updated in accordance to the availability of data.

Materials and Methods

Reconnaissance of data from the several qualitative sources performed and compared the information with the available data for understanding the exotic species in Sikkim.

The literature reviews, field visit and interaction among stakes performed for qualitative and quantitative data on alien species of Sikkim.

Results

Apparently, the enlisted plant species of this article, by and large, available in garden, kitchen garden and forest areas. Given to this fact, the brief biological characters and generic information of alien plants are compiled as under:-

Agathis robusta (C. Moore ex F. Muell) F.M. Bailey

Common Name: Queensland Kauri; Family: Araucariaceae; Native: Eastern Queensland, Australia; Biological Characters: Evergreen tree; height ca. 30-50 m, smooth and scaly bark; leaves ca. 5-12 cm long, ca. 2-5 cm broad, leathery, no midrib, opposite phyllotaxy; cones globose, 8-13 cm diameter, cylindrical male cones ca. 5-10 cm long and 1-1.5 cm thick.

Allamanda cathartica L.; Common Name: Allamanda; Family : Apocynaceae
Native: Tropical South America; Biological Characters: Evergreen, vine-like woody shrub, height ca. 2 m, brown bark, furrowed; twigs exude a milky sap when cut; leaves leathery, yellow-green to dark green leaves, ca. 6 to 16 cm long, obovate to oblong-lanceolate, entire margins; inflorescences axillary cymes; fruit capsules, subglobose, ca. 4 to 6 cm diameter (Howard, 1989; Liogier, 1995; Long and Lakela, 1976).

Ananas comosus (Linnaeus) Merrill var. *variegatus* (E. Lowe) Moldenke;
Common Name: Ivory Pineapple or Variegated Pineapple; Family :

Bromeliaceae; Native: America; Biological Characters: Large rosettes tough leaves, long, lanceolate, serrate margin; inflorescence terminal racemose; bracts brightly colored; tepals 6; fruit pseudocarp.

Araucaria bidwillii Hook; Common Name: False Monkey Puzzle

Family : Araucariaceae; Native : Queensland, Australia; Biological Characters: Monoecious tree, ca. 50 m tall, ca. 150 cm dbh; leaves spreading, glossy, dark-green, ca. 0.7-2.8 cm long, lanceolate or triangular-ovate, flattened, coriaceous, no midvein; cones formation ca. 14 years, ovoid-subglobose, ca. 30 × 22 cm; seeds ca. 2.5 cm long, elongate-elliptic, wingless (Huth, 2002; Smith and Butler 2002).

Araucaria luxurians (Brong. et Gris.) de Laub.; Common Name: Coast araucaria; Family: Araucariaceae; Native: New Caledonia; Biological Characters: Tree ca. 30 m. tall, dense rounded crown; leaves imbricate, scale-like, ovate, 5-7 mm, long ca. 4-5 mm. wide, midrib prominent; male cone cylindrical, ca. 12-17 cm. long, ca. 25-28 mm. wide; scales triangular, acuminate, microsporophylls oval, pollen sacs ca. 12-15; female cone ca. 10-12 cm. long, ca. 8-10 cm. wide; bracts short and stout, ca. 10 mm. long, seed ca. 3-3.5 cm. long; fruit drupe (Silba, 1986). Status : Endangered (Thomas, 2010)

Asparagus myriocladus Baker; Common Name: Ming fern; Family : Asparagaceae; Native: Southern Africa; Biological Characters: Vines, perennial; stems photosynthetic; cladophylls fasciculate; inflorescences racemose; stamens 6, distinct, equal, anthers versatile, 2-locular, dehiscence introrse; ovary superior, 3-locular, septal nectaries present; style 3-branched distally; fruits berry; 2n = 10.

Bambusa vulgaris Schrad ex. J.C Wendl; Common Name: Lota Bans

Family : Poaceae; Native : South China; Biological Characters: Lemon-yellow culms; dark green lanceolate leaves, densely tufted culms ca. 10-20 metres, ca. 4-10 centimetres thick; nodes slightly inflated; internodes ca. 20-45 centimetres; flowering not common, no seeds. Fruits rare (low pollen viability caused by irregular meiosis).

Bambusa multiplex Alf; Common Name: Chinese bans; Family : Poaceae; Native : South China; Biological Characters: Striking yellow culms, clumping bamboo ca. 25-35 feet, branches at culm nodes; flowers hermaphrodite.

Bambusa vulgaris* var *striata (Lodd. ex Lindl.) Gamble; Common Name: Pahelo Bans; Family: Poaceae; Native: New Guinea (Asia), Malaysia (Asia), Singapore (Asia); Biological Characters: Bracteate, indeterminate inflorescences, pseudospikelets, flowers with three lodicules, six stamens; three stigmas.

Beaucarnea recurvata Lem.; Common Name: Nolina / Ponytail Palm; Family : Asparagaceae; Biogeography : Eastern Mexico; Biological Characters: Height ca. 4 to 15 m; tropical xerophytic trees, ca. 6-10 m tall, trunk ca. 20-40 cm diameter; leaves evergreen, linear, strap-shaped, ca. 0.5-1.8 m long, ca. 1.5-2 cm broad, leathery, finely serrated margin; inflorescence panicles, ca. 75-110 cm long, flower ca. 1.5 mm diameter, greenish-white, six tepals; Status: Threatened (Cardel et al 1997; Hemaidez 1993a)

Borassus flabellifer L; Common Name: Tari; Family: Arecaceae; Native: Indonesia to Pakistan; Biological Characters: Robust, 25-40 m tall, Stem massive, ca. 1 m diameter, ca. 4 m high, leaves arranged spirally, leathery, strongly costapalmate; petiole woody, ca. 60-120 cm long, deeply furrowed; margins irregular teeth, blade suborbicular to flabellate, ca. 1-1.5 m diameter;

inflorescence peduncled; flowers larger than male ones, 3-merous, tricarpellate; fruit globose to subglobose drupe, ca. 15-20 cm diameter.

***Brassica oleracea* L.**; Common Name: Kale or borecole; Family: Brassicaceae; Native: Europe; Biological Characters: Green or purple leaves cabbage; no head formation.

***Brunfelsia grandiflora* D.Don**; Common Name: Heja aja bholi (Nepali); Family: Solanaceae; Native: Venezuela to Bolivia; Biological Characters: Shrubs; leaves exstipules; inflorescences racemose, clustered; flowers bisexual, regular, 5-merous; petals united; ovary 2-5-locular; axile placentation, style 1; fruit capsule.

***Calendula officinalis* L.**; Common Name: Pot marigold; Family: Asteraceae; Native: Probably native to southern Europe; Biological Characters: Herbaceous perennial, ca. 80 cm (31 in) tall; leaves oblong ca. 5-17 cm (2-7 in) long, hairy; inflorescences capitulum, 4-7 cm diameter, hermaphrodite; fruit achene.

***Callistemon citrinus* (Curtis) Skeels**; Common Name: Bottle Brush; Family: Myrtaceae; Native: Australian continent; Biological Characters: Small tree, ca. 1-3 metres height; leaves ca. 3 to 7 cm long, ca. 5 to 8 mm wide; flower spikes, ca. 6 to 10 cm length, ca. 4 to 7 cm diameter; stamens red or purplish-red anthers; fruit capsules.

***Camellia japonica* L.**; Common Name: Camellia; Family: Theaceae; Native: Japan; Biological Characters: Flowering shrub, ca. 1.5-6 metres (4.9-20 ft) tall; alternate leathery leaves, dark green, ca. 5-11 centimetres (2.0-4.3 in) long, ca. 2.5-6 centimetres (1.0-2.4 in) wide; Flowers ca. 3-4.5 centimetres (1.2-1.8 in) long, ca. 1.5-2.5 centimetres (0.6-1.0 in) wide; numerous stamens ca. 2.5-3.5 centimetres (1.0-1.4 in) long; three-lobed style ca. 3 centimetres (1.2 in) long; fruit globe-shaped capsule.

***Centaurea cineraria* L.**; Common Name: Dusty miller; Family: Asteraceae; Native: Island of Capraia in Italy; Biological Characters: Mature plants ca. 15 cm to 60 cm; leaves, spiny, elongated lobes; inflorescences pseudanthium.

***Cupressus macrocarpa* Hartw. ex Gordon**; Common Name: Monterey cypress or macrocarpa; Family: Cupressaceae; Native: Central Coast of California; Biological Characters: Heights ca. 40m, trunk diameter ca. 2.5m; leaves scale-like, ca. 2-5 mm long, ca. 4-8 mm long; cones globose to oblong, ca. 20-40 mm long, ca. 6-14 scales, mature ca. 20-24 months; male cones ca. 3-5 mm long.

***Cupressus torulosa* D. Don**; Common Name: Himalayan Cypress; Family: Cupressaceae; Native: Sichuan China and in Vietnam; Biological Characters: Evergreen trees, ca. 5-40 m tall, leaves scale-like, ca. 2-6 mm long, opposite decussate pairs, leaves needle-like, ca. 5-15 mm long; cones ca. 8-40 mm long, globose; maturity ca. 18-24 months; seeds small, ca. 4-7 mm long.

***Dracaena reflexa* Lam.**; Common Name: Song of India; Family: Asparagaceae; Native: Madagascar, Mauritius, and other nearby islands of the Indian Ocean; Biological Characters: Shrub; simple lanceolate leaves, ca. 5-20 cm long, ca. 1.5-5 cm broad, parallel venation, entire margin; tight whorls phyllotaxy.

***Eucalyptus tereticornis* Sm**; Common Name: Tarpin; Family: Myrtaceae; Native: Australia; Biological Characters: Tall trees ca. 45 metres tall; leaf blade ca. 9.5-18 long, 1.1-2.5 cm width, elliptic, aromatic, containing oil glands; flowers pedicellate, five sepals and petals and many stamens; long and

conspicuous stamens; fruits pedicellate, globular, ca. 5 x 5 mm, valves 4-5, exserted; cotyledons slightly bilobed; oil dots very sparse.

Euphorbia tirucalli L.; Common Name: Sword Fern; Family : Euphorbiaceae; Native :Eastern and southern Africa; Biological Characters: Unarmed shrub ca. 4-12 (-15) m high; whorls brittle succulent branchlets ca. 7 mm thick, green, longitudinally finely striated; cymes 2-6 cyathia, subsessile, ca. 3 x 4 mm, cup-shaped involucre; perianth distinctly 3-lobed, stamens ca. 4.5 mm long; tomentose ovary, lobes ca. 0.5 mm long; styles ca. 2 mm long; fruit capsule.

Ficus retusa L.; Common Name: Cuban-laurel; Family : Moraceae; Native:Cuba; Biological Characters: Evergreen tree; height ca. 18 m, leaves alternate phyllotaxy, stipulate, petiole ca. 2cm long, leaf blade obovate , ca. 5-15 cm, narrowed base, 3 veined; glossy, leathery leaves , dark green; inflorescence axillary cymes.

Ficus variegata Blume; Common Name: Variegated fig; Family : Moraceae; Native : Asia, islands of the Pacific and as far south east as Australia; Biological Characters: Mid-canopy tree ca. 38 m tall, ca. 110 cm dbh; leaves alternate, simple, tripli- to penni-veined, venation conspicuous, glabrous to hairy below; stipules ca. 9 mm long, glabrous to hairy; fruits ca. 12 mm diameter, red-brown, globose.

Furcraea foetida (L) Haw; Common Name: Green aloe; Family : Asparagaceae Native: Caribbean and northern South America; Biological Characters: Shrubby plant, ca. 50 cm high, leaves narrow-lanceolate, ca. 1.2-1.5 m long, ca. 7-16 cm wide; lamina succulent, glossy green; panicle many-flowered, ca. 1-3 m high; pedicels ca. 3-5 cm long, flowers ca. 3-4 cm long; tepals ca. 2.5-3.5 cm long; stamens ca. 1.5 cm long; fruit not seen.

Gardenia jasminoides Ellis; Common Name: Cape jasmine; Family: Rubiaceae Native: Native to China and Japan; Biological Characters: Evergreen shrubs ca. 1-15 metres tall; leaves ca. 5-50 centimetres long, ca. 3-25 centimetres broad, dark green, glossy leathery texture; flowers solitary, tubular-based corolla, 5-12 lobes; flowers strongly scented.

Grevillea robusta A. Cunn. ex R.Br; Common Name: Silver Oak/ Australian Silver Oak; Family : Proteaceae; Native :Australia; Biological Characters: Evergreen tree, 18-35 m tall, dented bipinnatifid leaves diameters excess of 1 m; leaves ca. 15-30 cm long, greyish white or rusty undersides; flowers golden-orange bottlebrush-like blooms, ca. 8-15 cm (3-6 in) long, ; flowers no petals, long calyx splits into 4 lobes; seeds dark brown leathery dehiscent follicles, ca. 2 cm long, winged seeds.

Lagerstroemia speciosa (L) Pers.; Common Name: Pride of India; Family: Lythraceae; Native: Southern Asia; Biological Characters: Medium-sized tree, ca. 20 metres tall; leaves deciduous, oval to elliptic, ca. 8-15 cm long, ca. 3-7 cm broad, acute apex, flowers erect panicles ca. 20-40 cm (7.9-16 in) long; flower ca. 6 white to purple petals, ca. 2-3.5 cm long.

Manilkara zapota (L.) Van Royen; Common Name: Chiku; Family: Sapotaceae Native: Mexico, Central America and the Caribbean; Biological Characters: Plant ca. 30 m (98 ft) tall , trunk diameter ca. 1.5 m; leaves alternate, elliptic to ovate, ca. 7-15 cm long, entire margin; flowers six-lobed corolla; fruit berry, ca. 4-8 cm diameter, ca. 2-5 seeds.

Platycladus orientalis (L.) Franco; Common Name: Thuja; Family: Cupressaceae; Native : China, Korea; Biological Characters: Small tree ca. 15-

20 m tall, ca. 0.5 m trunk diameter; scale-like leaves ca. 2-4 mm long; cones ca. 15-25 mm long, mature ca. 8 months; seeds ca. 4-6 mm long, no wing.

Polystichum acrostichoides (Michx.) Schott; Common Name: Christmas fern; Family: Dryopteridaceae; Native: Eastern North America from Nova Scotia west to Minnesota and south to Florida; Biological Characters: Clusters fronds, crownless rootstock ca. 1-2 ft. in length; tall fertile fronds; divided fronds medium to coarse texture; silvery fiddleheads emerge in early spring.

Pterygota alata (Roxb.) R.Br. var. *irregularis* (W.W.Sm.) Deb & S.K.Basu; Common Name: Mad Tree/ Nakaley; Family: Sterculiaceae; Native :South West India, Andamans, Burma and Bangladesh; Biological Characters: Evergreen Trees; leaves ca. 36 ft; infrequently palmately lobed or compound; stipulate; flowers actinomorphic, bisexual; perianth uniseriate, ca. 3-5 valvate, androecium two whorls, 5 stamens each, androgynophore; gynoecium: 2-several axile ovules.

Rhododendron simsii Planch.; Common Name: Azalea; Family : Ericaceae; Native: China and Taiwan; Biological Characters: Shrubs, ca. 2(-5) m tall; branches many and fine, densely shiny brown appressed-setose ; leaf blade ovate, elliptic-ovate or obovate to oblanceolate, ca. 1.5-5 × 0.5-3 cm; pedicel ca. 0.8 cm; calyx deeply lobed; lobes triangular-long-ovate, ca. 5 mm, coarsely appressed-hairy, margin ciliate; corolla broadly funnellform, rose, bright to dark red, or white to rose-pink, ca. 3.5-4 × 1.5-2 cm, lobes obovate, 2.5-3 cm; stamens ca. 10;; ovary ovoid, 10-locular, densely shiny brown-strigose; capsule ovoid, ca. 10 mm.

Roystonea regia (Kunth) O. f. Cook; Common Name: Royal palm; Family : Arecaceae; Native : Southern Florida; Biological Characters: Height ca. 20-30 metres tall; stem diameter 4 ca.7 centimetres; leaves ca. 4 m long; fruit acheme, spheroid to ellipsoid shape, 8.9-15 millimetres long, 7-10.9 mm wide.

Sambucus wightiana Wall. ex Wight & Arn.; Common Name: Elder; Family : Caprifoliaceae; Native: Native to Africa and Asia; Biological Characters: Shrubby herbs, 1-1.5 m tall; leaves ca. 25 cm long , ca. 5-9 leaflets; inflorescence corymbose, pedunculate; flowers minute, c. 5 mm diameter, pedicellate; pedicel jointed. Bracteole filiform, c. 1 mm below the joint; hypanthium turbinate, c. 1 mm long; calyx 5-toothed; teeth minute, deltoid; corolla rotate, c. 5 mm in diameter, 5-lobed, whitish-yellow, lobes 1.5 mm long, obtuse, 3-nerved; stamens 5, attached at the base of the corolla, anthers oblong, filament twice as long as the anther; stigmas 3, subsessile; fruit drupe, globose; seed oblong, ca. 2.7 mm long.

Saraca asoca (Roxb.) Wilde; Common Name: Sita Ashoka; Family: Fabaceae Native : South India, Bangladesh; Biological Characters: Evergreen tree; leaves pinnate, ca. 30 - 60 cm long, flowers orange-yellow, dense corymbs, very fragrant, fruits flat black pods, leathery, compressed; seeds ca. 4 - 8 per pod, ellipsoid.

Saraca indica L.; Common Name: Ashok Tree; Family: Caesalpiniaceae; Native: Trees of Pakistan; Biological Characters: Leaves pinnate, paired leaflets.; trees flowers : no petals, brightly colored sepals, stamens projecting ca. eight inches long.

Schefflera actinophylla (Endl.) Harms; Common Name: Umbrella Tree/ Octopus Tree; Family: Araliaceae; Native : Tropical rainforests and gallery

forests in Australia; Biological Characters: Evergreen tree ca 15 m tall, compound, green leaves in groups of seven leaves; inflorescences raceme.

Spathiphyllum wallisii Regel; Common Name: Peace lily, White sails, or spathe flower; Family: Araceae; Native: Colombia and Venezuela; Biological Characters: Herbs, perennial, terrestrial rhizomes; corms underground, starchy; leaves clustered sheathing base; leaf blade simple elliptic to obovate or spatulate; inflorescences spadices, ca. 3–900 tightly grouped, sessile flowers, subtended by spathe; fruits berries; seeds ca. 1–40 (or many) per berry.

Strelitzia reginae Aiton; Common Name: Crane Flower or Bird of Paradise; Family: Strelitziaceae; Native: South Africa; Biological Characters: Plant ca. 2 m tall; leaves ca. 25–70 cm long, ca. 10–30 cm broad, evergreen leaves, fan-shaped crown; flowers: hard, beak-like sheath, perpendicular to the stem, appearance of a bird's head and beak; three brilliant orange sepals and three purplish-blue petals, two blue petals form an arrow-like nectary.

Tecoma stans (L.) Kunth; Common Name: Trumpetbush; Family: Bignoniaceae; Native: Americas; Biological Characters: Medium-sized shrub, many branches; leaves opposite, pinnately compound, ca. 5 to 13 saw-toothed leaflets; tubular flowers ca. 4 to 5 cm in length; fruits ca. 10- to 25-cm pods, papery-winged seeds.

Trachycarpus martianus; Common Name: Chinese Windmill palm; Family: Arecaceae; Native: Khasia Hills, Meghalaya Province; Biological Characters: Evergreen Tree ca. 12 m, ca. 2 m, flowers dioecious.

Zamia furfuracea L.f.; Common Name: Cardboard Palm; Family: Zamiaceae; Native: South eastern Veracruz state in eastern Mexico; Biological Characters: Plant ca. 1.3 m tall, ca. 2 m. width; leaves radiate, ca. 50–150 cm long, petiole ca. 15–30 cm long, ca. 6–12 pairs of extremely stiff, pubescent green leaflets; leaflets ca. 8–20 cm long, ca. 3–5 cm wide; female plant: rusty-brown cone; smaller male cone clusters on separate plants.

Discussion and Conclusion

Economic aspect of such introduced species in the Himalayan terrain has not been derived with distinct line of significance. These species are grown in the Himalayan regions from many centuries but their dates of introduction could not be able to trace which may require further researches. Some of the enlisted plants are cultivated for the economic activities in Sikkim inter alia *Brassica oleracea* L. *Asparagus myriocladus* Baker *Ananas comosus* (Linnaeus) Merrill var. *variegatus* (E. Lowe) Moldenke, *Camellia japonica* L. etc.

Besides these, there are some plants which are common in the garden and floricultural activities. Such plants are *Roystonea regia* (Kunth) O. f. Cook *Saraca asoca* (Roxb.) Wilde, *Agathis robusta* (C. Moore ex F. Muell) F.M. Bailey *Allamanda cathartica* L., *Araucaria bidwillii* Hook, *Araucaria luxurians* (Brong. et Gris.) de Laub., *Bambusa vulgaris* Schrad ex J.C Wendl, *Bambusa multiplex* Alf, *Beaucarnea recurvata* Lem., *Calendula officinalis* L., *Callistemon citrinus* (Curtis) Skeels, *Camellia japonica* L., *Cupressus macrocarpa* Hartw. ex Gordon, *Grevillea robusta* A. Cunn. ex R.Br., *Lagerstroemia speciosa* (L) Pers., *Zamia furfuracea* L.f. *Pterygota alata* (Roxb.) R.Br. var. *irregularis* (W.W.Sm.) Deb & S.K.Basu etc.

The roles of the exotic species and their relationship with the species of the Sikkim Himalaya are included in this paper. Nevertheless, the scope of researches on the impact analysis is worth for the prospective of the region.

Thus, there is a certain research scope for impact analysis focusing on outcomes and adoptive features, which may articulate Eastern Himalayan flora with distinctive identity. Further, putting well to such alien vegetation matrix may extent support to the Government for the policy building and to researchers and managers for planning and preparation.

Literature cited.

- Cardel, Y., Rico-Grey, V., Garcia -Franco, J. and Thien, B.L. 1997. Ecological status of *Beaucarnea gracilis*, an endemic species of the semiarid Tehuacan Valley, Mexico. *Conserv. Biol.* 11(2):367-374.
- Hernandez, L. 1993b. Cladistic analysis of the American genera of Asparagales and the systematic study of *Beaucarnea* (Nolinaceae) and *Hemiphylacus* (Hyacinthaceae). PhD diss Univ, Texas, Austin.
- Howard, R.A. 1989. *Flora of the Lesser Antilles, Leeward and Windward Islands. Dicotyledoneae*. Part 3, Vol. 6, Arnold Arboretum, Harvard University, Jamaica Plain, M.A. Pp. 658.
- Huth, J. 2002. *The bunya pine, the romantic Araucaria of Queensland*. International Araucariaceae Symposium: Auckland.
- Kumar, R. and Singh, G. 1988. Investigations into the cause of sterility. *Tecoma stans* L. *Letters Botaniques* (France) 135(2): 131-135.
- Liogier, H.A. 1995. *Descriptive flora of Puerto Rico and adjacent islands*. Vol. 4, Editorial de la Universidad de Puerto Rico, San Juan, PR. Pp. 617.
- Long, R.W. and Lakela, O. 1976. *A Flora of Tropical Florida*. Banyan Books, Miami, F.L. Pp. 962.
- Struwe, L. 2009. *Field identification of the 50 most common plant families in temperate regions (including agricultural, horticultural, and wild species)*. Rutgers The State University of New Jersey.
- Little, E.L., Jr. and Wadsworth, F.H. 1964. *Common trees of Puerto Rico and the Virgin Islands*. Agriculture Handbook 249. U.S. Department of Agriculture, Forest Service, Washington, DC. Pp. 548.
- Thomas, P. 2010. In: IUCN 2012. IUCN Red List of Threatened Species.