

THREATS AND CONSERVATION – 8

8.1. Introduction

Palms are one of the most interesting floristic groups of West Bengal next to orchids and bamboos. The phyto geographical area of palms in this broad region comprises of the evergreen forests of Darjeeling Himalaya and/or evergreen mixed forests of Terai and Duars, Western undulating highland and plateau, North and South Bengal plains and Gangetic Delta. The reduction of the forest cover in all the above mentioned regions combined with the over exploitation of the forest have contributed to the depletion of the natural population of the palms. As a result a majority of the wild palm population of West Bengal have fallen into different categories of threat. The causes of the threat to palm flora have generally been grouped into two categories *viz.*, natural and induced. The natural causes are flood, earthquake, landslides, natural competition among the species, lack of pollination, natural regeneration, disease and also climate change. The induced threat are deliberate destruction of natural habitats by developmental project works, destruction of forest ecosystem by Jhum cultivation, extension of tea gardens and over exploitation of such species for commercial or other house hold uses. It is an established fact that in India natural forests are converted into revenue earning timber forests causing loss of valuable plant species.

The present study has shown that natural population of palm and canes are highly fragmented and very limited uninterrupted population were noticed in the wild. Only 4-5 healthy population of *Phoenix acaulis* and *Phoenix rupicola* in hilly slopes of Himalaya in Darjeeling and Kalimpong were noticed. The under story palms of the rain forests, such as *Arenga nana*, *Pinanga gracilis*, *Pinanga grifithii*, *Wallichia caryotoides*, *Wallichia triandra* are most affected due to destruction of forest cover. *Licuala peltata*, a widely distributed palm of this region (Himalaya and Terai and Duars) and over exploitation of its leaves and stem for local uses make serious threat for this species. *Trachycarpus latisectus* of the lower eastern Himalayan region is under immediate threat of extinction in the wild and very small number of individuals surviving on a steep, deforested slope on rocky soil at Mirik busy between 1300 m to 1400 m altitude. *Trachycarpus martianus* and *T. fortunei* reported from the temperate climates of Himalayan range in Darjeeling and Kalimpong district where these palms

has restricted in distribution. These rare palm species grows on highly sloped areas of dry ground as also in the middle of wild forests but at present its population are very low due to forest clearing. *Arenga micrantha* is a newly described palm from eastern Bhutan close to Himalayan region of Darjeeling district has restricted distribution. It grows on steep, highly inaccessible forested slopes. Rattans or the canes are another most vulnerable group in this region. It is estimated that huge quantity of raw canes are using in manufacturing industry to makes cane furniture, baskets, chair bottoms and various artifacts for rituals and even ornaments employing large number of rural and urban artisans. The use of cane is increasing and the demand of raw cane is putting pressure on the limited resource bases. With the removal of covering trees in the primary forests, clearing of hill forest for jhum cultivation, deforestation, tea garden extension, construction of road, dams, extension of plantation area for cultivating various plants, timber trees, the habitats of cane species are being destroyed in the northern region of West Bengal. Due to shortage of raw canes from the forest of other states, cane furniture industries are depending more on imported canes from West Bengal of India especially from Darjeeling, Terai and Duars region.

Population size of *Nypa fruticans*, *Phoenix paludosa* and *Phoenix sylvestris* in Sundarbans are reducing at a faster rate and only a few colonies exist in some small pockets of the tidal forests. The loss of population of *Nypa fruticans* and *P. paludosa* in Indian Sundarbans are due to relative scarcity of fresh water flow from the upper reaches and also due to over exploitation for making charcoal and leaves for using as thatches. It is reported that leaves of *Golpata* are durable and last for about 10 years.

8.2. Physical threats on palms in West Bengal:

It is now clear that the palm diversity is significant and the ecosystem of West Bengal is somewhat dependent on the wide range of Arecales. Along with other floristic elements, the Arecales of the region at present are under severe threat of losing their habitat mostly due to anthropogenic reasons. Such threats can be perceived only after detailed scientific investigations at different corners of diversified areas of West Bengal. The major recorded physical threats are as follows:

8.2.1. Habitat loss: Palm and canes are either large trees or spinous dense shrubby bushes in various wild habitats. Like other important floristic elements drastic habitat alteration cause serious loss of population of various palm and canes (Fig. 81).

8.2.1.a. Road network: Continuous extension of metallic roads and rail-links crisscrossing the forests of Terai, duars, hills of Darjeeling and Kalimpong districts and North and South Bengal plains are gradually destroying the natural habitats that directly affects the population size of palms and rattans.

8.2.1.b. Fragmentation: Fragmentations of wild habitats and conservatories are major threats for existing vegetation and it mostly created through frequent human activities by establishing road networks and colonies. Natural vegetations are greatly fragmented due to forests clearing by human activities such as rural development, urbanization, agricultural activities and the creation of hydroelectric reservoirs. Roads are the major causes of natural habitat fragmentation because roads divide large landscapes into minor patches and change interior natural forest pattern.

8.2.1.c. Developmental works: The rapid extension of human settlement and many anthropogenic activities has posed threat to palm diversity globally resulting in extensive habitat loss and decrease in palm population. In this case the threats result from activities such as land clearing for human settlements, dams, huge developmental works, exploitation of palms for making household items, furniture and other purposes to meet their pleasure, in addition to which they are also used for daily chores for fuel, food, fodder etc. Palm also forms one of the good raw materials for industries and has increasing day to day demand over the globe.

8.2.1.d. Tea gardens: *Calamus erectus*, *Calamus longisetus*, *Daemonorops jenkinsiana* and *D. teraiensis* are the most common rattan species were recorded from margin of nearby tea garden in terai, duars, Darjeeling and Kalimpong district The rapid extension of existing tea gardens and creation of new tea gardens cause severe lose of wild vegetation along with palm species in sub-Himalayan and Himalayan West Bengal.

8.2.1.e. Unscientific collections from wild: Unscientific extraction of various wild rattans from natural habitats by many local communities, in order to run their lifestyle and meet the industrial demand of cane industries causing serious demolition of their population. Excessive cattle grazing are destroying seedling and sapling of different plants including palms and canes.

8.2.1.f. Climate change: The climate is changing globally at a faster rate than normal as compared to past many decades. The main reason for the climate change consists in

increasing human population followed by their activities such as grazing, destructive lumbering, logging, pollution due to industries, transport road extensions etc. Because of drastic climatic change, the soil is polluted and its quality is degraded on account of which the growth of palms is affected adversely. Closed canopy nature forms important feature of rainforests where openings and canopy gaps formed by branch fall, crownfall, treefall etc., determine the forest structure. These canopy gaps retard the regeneration of palms population to a certain extent.

8.3. Conservation

Palm conservation does not advocate a total stoppage of palm collection and utilization because this will deprive rural artisans and craftsmen from earning their livelihood and the furniture industries will suffer causing unemployment and resentment. For conserving the palm resource bases some serious action is needed so that productive clumps are maintained within their capacity to revive. As most of the indigenous palms as well as rattan are clump forming the only care that needs is to provide support to the newly growing shoots and at the same time maintenance of the canopy. Some forest and silviculture departments have already introduced rules against destruction of palms and rattan and have focused on the planting of seeds and rootstocks of palms.

8.3.1. *In – situ* conservations

In-situ conservations or the onsite conservation are being carried out to protect tree diversity in their natural populations. The protected area network in this includes National Parks, Wildlife Sanctuaries, Biosphere Reserve (terrestrial or marine) etc. This type of conservations helps to protect endangered palms as well as others plants and animal species in their own natural habitat.

In West Bengal 15 wild life sanctuary where palms are naturally growing, they are Ballavpur WLS, Bethuadahari WLS, Bibhuti Bhusan WLS, Holiday Island WLS, Jorepokhri Salamander WLS, Chapramari WLS, Chintamani Kar Bird Sanctuary, Buxa WLS, Lothian Island WLS, Mahananda WLS, Raiganj WLS, Ramnabagan WLS, Sajnakhali WLS, Senchal WLS, Neora Valley WLS, West Sunderban WLS and 6 National parks like Buxa National Park, Gorumara National Park, Singalila National Park, Sundarban National Park and Jaldapara National Park. In West Bengal, there has been no any significant serious effort so far was taken to conserve the palms and rattan

	<i>acanthospathus, C. viminalis, C. tenuis, C. pseudoerectus, C. latifolius, C. numbariensis, C. floribundus, C. kinghianus, C. khasianus, C. flagellum, Daemonorops jenkinsiana, D. teraiensis</i>	
Jorepokhri Salamander WLS	<i>Calamus acanthospathus C. Calamus numbariensis, numbariensis, C. flagellum, C. Daemonorops jenkinsiana, erectus, C. leptospadix, Daemonorops jenkinsiana, D. teraiensis</i>	
Neora Valley NP	<i>Areca catechu, P. rupicola, Calamus erectus, C. acanthospathus, C. numbariensis, C. floribundus, C. flagellum, Daemonorops jenkinsiana, Plectocomia himalayana, P. bractealis, Pinanga gracilis, P. Griffithi, Trachycarpus fortunei, T. matrianus</i>	-----
Senchal WLS	<i>Areca catechu, P. rupicola, Calamus erectus, C. acanthospathus, C. tenuis, C. latifolius, C. numbariensis, C. floribundus, C. flagellum, Daemonorops jenkinsiana, Plectocomia himalayana, P. assamica, P. bractealis, Pinanga gracilis, P. griffithi, Trachycarpus fortunei, T. Matrianus, Caryota urens, C. obtusa</i>	-----
Singalila NP	<i>Caryota urens, C. obtusa, Plectocomia himalayana, P. assamica, Trachycarpus fortunei, T. martianus</i>	-----
Sundarbans NP	<i>Nypa fruticans, Phoenix paludosa, Nypa fruticans, Phoenix P. sylvestris, Cocos nucifera, Areca paludosa, P. sylvestris, catechu</i>	
Jaldapara NP	<i>Areca catechu, Areca triandra, Phoenix acaulis, P. sylvestris, P. rupicola, P. lourerii, Borassus flabellifer, Cocos nucifera,</i>	-----

Calamus erectus, *C.*
acanthospathus, *C. viminalis*, *C.*
tenuis, *C. pseudoerectus*, *C.*
latifolius, *C. numbariensis*, *C.*
floribundus, *C. kinghianus*, *C.*
khasianus, *C. flagellum*,
Daemonorops jenkinsiana, *D.*
teraiensis, *Pinanga gracilis*, *P.*
griffithii

8.3.2. *Ex – situ Conservation*

The term *ex situ* as used in this action plan refers to Botanic Gardens, arboreta and similar institutions containing scientifically ordered and maintained collection of live plants and maintain their population through cultivation and usually documented and labelled the species (Fig. 82,83,84). These areas are also remaining open to public for the purpose of recreation, education and research purposes.

8.3.2.a. **Botanical and Horticultural gardens:**

The Botanical gardens can play an effective role in conserving the genetic diversities of rare and endangered palms by bringing them under mass propagation. A.J.C Bose Indian Botanic Garden, at Howrah since its inception in 1787 performed a leading role in introduction and conservation of several species of palms including the some of the presently marketed RET palms in the garden. An inventory of the existing palms in the Indian Botanic Garden was prepared by S. K. Basu (1978). Forest Departments can supply seeds and propagules to the Botanical Gardens. Many of our indigenous palms are not difficult to grow in *ex situ* condition provided we select right condition. Among the rare and endangered palms of West Bengal it was possible earlier to bring into cultivation several palm species such as *Phoenix rupicola*, *P. paludosa*, *Livistona jenkinsiana*, *Licuala peltata*, *Trachycarpus latisectus*, *Wallichia densiflora*, *W. caryotoides*, *W. disticha*, *Pinanga gracilis*, *Nypa fruticans* etc. Indian Botanic Garden, Howrah has good collection of cane species as germplasm such as *Calamus viminalis*, *C. tenuis*, *C. longisetus*, *C. guruba*, *C. inermis*, *C. leptospadix* and *Daemonorops jenkinsianus*. For conserving the wild cane population in the depleted forests efforts should be made to reintroduce those species which were there previously. Lloyd's Botanical Garden, Darjeeling is a field gene bank and plays an important role for *ex*

situ conservation of variety of plants as well as palms and canes that growing in temperate climates. A good number of wild palms and canes like *Trachycarpus martianus*, *T. fortunei*, *Pinanga gracilis*, *Arenga micrantha*, *Wallichia disticha*, *W. caryotoides*, *W. oblongifolia*, *Plectocomia himalayana*, *P. assamica*, *Calamus erectus*, *C. leptospadix* etc. are conserving in this garden in scientific manner.

Many wild palms of this region such as *Wallichia triandra*, *Wallichia caryotoides*, *Arenga nana*, *Pinanga griffithii* *Pinanga gracilis*, *Pinanga hookeriana*, are ornamental in appearance as they are sensitive to exposure and need protection by the forest canopy. All *Pinanga* species and *Wallichia triandra* are endemic to India with very limited population size and can be protected these species through mass propagation and cultivation process. Among the endemic palms of West Bengal, *Areca nagensis*, *Arenga micrantha*, *A. nana*, *Pinanga griffithii*, *Pinanga gracilis*, *Plectocomia assamica*, *Phoenix rupicola* are considered as vulnerable and *Licuala peltata*, *Wallichia triandra* have become rare based on the physical observation of their population size in study area. For canes forest habitat is being lost or fragmented into isolated patches as a result of human population pressure and activities carried out in the name of development. Fragmentation is a particular problem because of the adverse effect upon the niches for which certain palms and canes minimally survive and optimally thrive. For conservation of some palms such as *Wallichia triandra*, *Areca nagensis*, *Arenga nana*, *A. micrantha*, *Licuala peltata* were introduced and cultivated because of their ornamental appearance.

8.3.2.b. Forest department and other institutions:

The forest department should initiate a program to promote the domestication and cultivation of commercially useful palms and canes which are currently gathered from the wild only. Research and field trials are necessary in several ecological regions to develop for the species suitable for cultivation in different locations. Various wild members of Arecaceae of this region are suffering by different types of serious threats (table 26) and a very limited works were (Basu and Basu 1987; Basu 1998; Mondal and Chowdhury 2018) have done some notable scientific investigation on introduction and cultivation of RET palms like *Wallichia densiflora*, *Licuala peltata*, *Calamus longisetus*, *C. nambariensis*, *Plectocomia bractealis*, *Corypha taliera* and many others. Centre for Conservation of Medicinal and Aromatic Plants of University of North

Bengal also one of the leading *ex situ* conservatory where recently a good number palms and canes that growing in Himalayan habitats are planted and conserved carefully. 19 species representing 12 genera of palm and canes are primarily conserved here scientifically. *Phoenix rupicola*, *P. paludosa*, *Livistona jenkinsiana*, *Wallichia densiflora*, *W. caryotoides*, *W. disticha*, *Nypa fruticans*, *Calamus viminalis*, *C. tenuis*, *C. leptospadix*, *Areca triandra*, *A. catechu*, *Caryota urens*, *C. obtusa* etc are the important members of this garden.

Table 26: Palms and canes thought to be rare and threatened in West Bengal, India

Taxa	Cause of Threat
<i>Areca nagensis</i>	An endemic palm of India. Very similar to <i>Areca triandra</i> . Present population in the wild is not extensive.
<i>Arenga gracilis</i>	A rare palm, known from the type specimens only. No further collection was available.
<i>Arenga micrantha</i>	A rare palm, recently described from the mountain area of Sandakhphu and Arunachal Pradesh.
<i>Phoenix rupicola</i>	Its wild population is restricted at few lower mountain slopes
<i>Wallichia disticha</i>	Its present population in upper part of west Bengal, Meghalaya and Arunachal Pradesh is getting depleted due to burning of the hill forests for Jhum Cultivation.
<i>Wallichia triandra</i>	A rare palm found only in the Lohit district of Arunachal Pradesh. Now reported from Kurseong District.
<i>Plectocomia himalayana</i>	An endemic species in the middle and upper hill forests (1500-2500 m alt.) of eastern Himalaya. Vulnerable due to destruction of habitats.
<i>Plectocomia assamica</i>	An endemic species of the lower hill forests of West Bengal, Assam and Arunachal Pradesh. The tribal of Arunachal Pradesh use long cane of these species for making hanging bridges over streams, rivers etc. Vulnerable due to destruction of habitats, flowering and

	fruiting habitats.
<i>Plectocomia bractealis</i>	An endemic species known from type specimens only Habit unknown.
<i>Plectocomia khasiyana</i>	An endemic species in the moist forests of Khasi hills between 600-1200 m alt. Now infrequent to rare in its natural habitat. Report to be occurring in some sacred groves.
<i>Calamus latifolius</i>	Restricted in the lower hill valleys of the eastern and Himalaya upto 1000 m alt. Also distributed in Bhutan and Bangladesh. One of the most exploited canes of eastern and northern India. The cane is bright green when fresh. Vulnerable in India and Bangladesh.
<i>Calamus inermis</i>	An endemic species in the Darjeeling and Sikkim Himalaya. This strong cane was frequent in the mixed plain forests and lower hill forests when it was first described by Anderson (1869). One of the big diameter canes exploited for making poles and sticks. Now vulnerable due to overexploitation and destruction of habitats.
<i>Calamus numbariensis</i>	An endemic species of Assam. Now infrequent in the moist forest of Assam valley. Recently discovered from Buxa tiger reserve and Gorumara NP of West Bengal.
<i>Calamus khasianus</i>	An endemic species of Meghalaya. Now frequent in the moist forests of Khasi and Garo hills. Recently discovered from Buxa forest range of Jalpaiguri District of West Bengal. Rare in the wild now.
<i>Calamus erectus</i>	Grows in the lower hill valley forest especially on the drier slopes. This is the only indigenous cane with erect stems. Now infrequent in the <i>Teesta</i> and <i>Rangit</i> valley of Sikkim and West Bengal. This species is also threatened in the Chittagong hill tracts of Bangladesh.

<i>Calamus gracilis</i>	Infrequent in the moist forests between 1000-1500 m alt. of lower and middle hill forests. This species is now untraceable in Bangladesh.
<i>Calamus kingianus</i>	An endemic species of West Bengal, Assam plain forests. This thin stemmed bushy cane prefers to grow prostrate on the moist alluvium. Now infrequent in the natural habitats.
<i>Calamus acanthospathus</i>	A strong cane of lower and middle Himalayan forests of West Bengal, Sikkim, Arunachal Pradesh and Meghalaya and the adjacent countries like Nepal and Bhutan. Now infrequent in India.
<i>Daemonorops jenkinsianus</i>	Restricted in the lower hill valleys of Eastern Himalaya up to 700 m alt. It is also distributed in Bhutan and Bangladesh. The most exploited cane of this region.

8.4. Information about palm flora

To make conservation strategy we need details information about that particular group of flora and for which extensive field work is required. Present study record entire palm and cane flora of West Bengal during the last five year (2013 – 2018). Floristic data is the basic data for framing or implementing conservation steps. Season wise and habitat wise entire palm and cane data were explored and it was recorded that a total of 50 indigenous palms and cane were widely growing in nature with variable population sizes. *Calamus* is the largest recorded genus that represents 17 species which strictly restricted to tropical and sub-tropical forests of North Bengal areas in West Bengal particularly in Darjeeling, Kalimpong, Jalpaiguri, Alipurduar and Cooch Behar districts. Only *Calamus tenuis* is growing as road side bushes or found growing in fragmented reserve forest near water bodies of Gangetic plains. *Plectocoemia* is a hexaxanthic rattan represents three species that were mostly growing in high altitude temperate forests of Darjeeling and Kalimpong districts. The majority of palms are shade loving, but few species like *Borassus flabellifer*, *Cocos nucifera* and *Phoenix sylvestris* grow in regions fully exposed to sunlight and growing throughout the Bengal except the Himalayan region. The beautiful fan-leaved palm like *Licuala peltata* and *Livistona jenkinsiana* have a restricted distribution in shady moist hilly slopes near

Teesta River and middle part of Darjeeling Himalaya (upto 1830m). Another robust beautiful palm genus *Caryota* and *Pinanga* is common in moist tropical forests of Terai Duars and Himalayan part of Darjeeling and Kalimpong district upto 1400 m of an altitude.

8.5. Study of population of palms

Population of specific palm and cane species is quite essential data for measuring the threat effect on it and it also helps to implement the conservation strategy. During field survey of present study some important information of few taxa were observed. The population size of almost all the rattans species in their natural habitats. *Calamus erectus*, *C. tenuis*, *C. viminalis* were recorded from many locations with dense and big population size. Rest species of *Calamus* were quite rare in occurrence in wild and facing lots of threats leads to huge loss of population due to anthropogenic pressures. *Daemonorops jenkinsiana* is common in the forests of terai (Bengdubi forest and Mahananda WLS) and very little population from Duars forests. *Phoenix acualis* is quite common in the Himalayas and Western plateau with limited population. *Nypa fruticans*, *Phoenix paludosa* and *P. dactylifera*, *P. sylvestris* are also dominant components in the tidal ecosystem of Sundarbans, Andaman and Nicobar Islands and are popularly known as 'Golpata' 'Hental', *Khajur* and 'Pindi khajur' respectively. Their present populations in Sundarbans are reducing at a faster rate and the natural populations of these estuarine palms are now a few colonies existing in some small pockets of the tidal region. The loss of population of *Nypa fruticans* in Indian Sundarbans is due to relative scarcity of fresh water flow from the upper riches and also due to over exploitation for making charcoal and leaves for using as thatches.

8.6. Study reproductive potentiality of palms

Present study recorded the reproductive potentiality of palm and cane flora of West Bengal during the last five years (2013–2018) that depends on species to species. Few species like *Cocos nucifera*, *Borassus flabellifer*, *Areca catechu*, *Wallichia oblongifolia*, *W. disticha*, *Plectocomia himalayana*, *P. assamica*, *P. bractealis* and *Phoenix paludosa* have recorded low reproductive potentiality that depends on physical factors as well as natural factors. *Caryota urens*, *C. obtusa*, *C. mitis* and species of *Corypha*, *Calamus* and *Daemonorops*, *Phoenix*, *Dypsis*, *Roystonea*, *Ptychosperma*,

Chamaedorea produce large quantity of seeds due to their high reproductive potentiality.

8.7. Sustainable utilization of wild palms

Plant resources have high accessible source of products and incomes for economically backward societies, and are subsequently under extensive pressure to provide environmental benefits. Sustainable utilization and conservation of palms are essential for the continuation of ecosystem functioning. Palms occupy a very important position among all the economic plants, as they are one of the major sources of man's food. Awareness programmes are essential for sustainable utilization of palms and cane.

Tender leaves, young inflorescence, pith of the stem, fruits and seeds, endosperm of many palms are edible and provide all the nutritional materials for healthy living. The four extensively domesticated palms in the plant kingdom as well as palms are *Cocos nucifera*, *Phoenix dactylifera*, *Areca catechu* and *Elaeis guineensis*. Semi wild palms such as *Borassus flabellifer*, *Phoenix sylvestris*, *Caryota urens*, *Arenga pinnata*, *Livistona jenkinsiana*, *Phoenix paludosa*, *Phoenix rupicola*, *Wallichia disticha*, *Licuala peltata*, *Trachycarpus martianus* and some other palms and canes have also local and commercial uses as source of food, sugar, wine, oil, fibres and various other items like building material and furniture. Soft young leaves are also useful for making various household items. Due to high nutritional and medicinal values of the edible portion of coconut palm, date palm and Areca palm, they are commercially cultivated. Local, medicinal, commercial and ethnic uses of indigenous palms however are more to be known through extensive survey, wide interaction and document research.

In order to sustain the life the local people are over exploiting palm resources unscientifically. Sustainable withdrawal of such natural resources can reduce the excessive pressure on those species and frequent awareness initiatives among local and tribal community would be more fruitful to save the palm population in wild for future use and research.



Fig. 81: A, B & E. Rattans destroyed by wild animals and local people C. *Areca catechu* L. D. *Cocos nucifera* L. Fuel and house hold materials F. *Phoenix paludosa* Roxb. destroyed by fisherman of Sundarbans



Fig. 82: Palms seedling conservation **A.** *Licuala grandis* Wendl. **B.** *Licuala spinosa* Thunberg **C.** *Sabal mauritiformis* (Karsten) Griseb. et Wendl. **D.** *Ptychosperma macarthurii* (Wendl.) Nichols **E.** *Chamedorea elegans* Mart. **F.** *Phoenix sylvestris* Roxb.

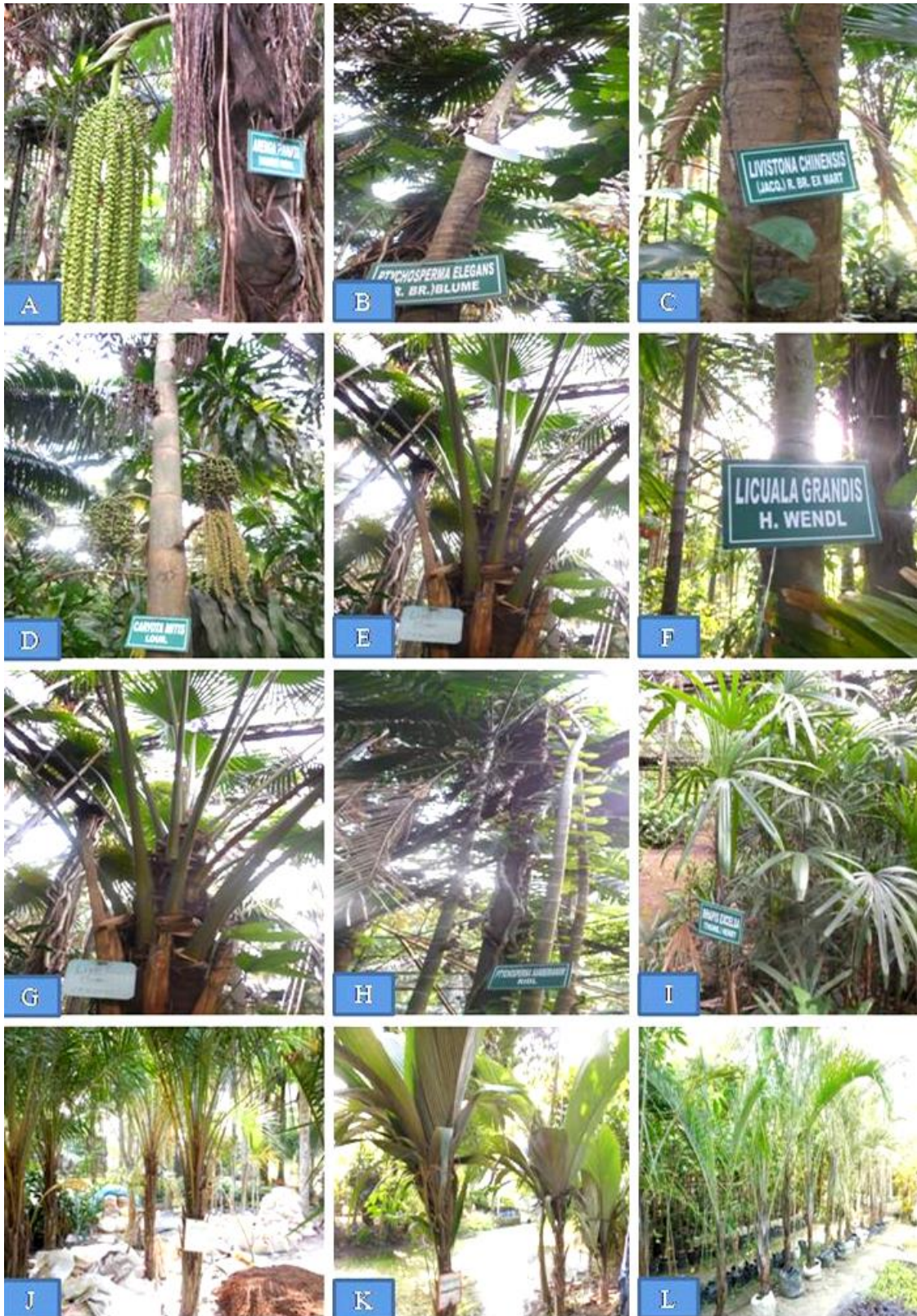


Fig. 83: *ex-situ* conservation of palms **A.** *Arenga caudata* (Lour.) Moore. **B.** *Ptychosperma elegans* (R. Br.) Bl. **C.** *Livistona chinensis* (Jacq.) R. Br. **D.** *Caryota mitis* Lour. **E & G.** *Pritchardia pacifica* Seem et Wendl. **F.** *Licuala grandis* Wendl. **H.** *Ptychosperma waitianum* Essig. **I.** *Rapis excelsa* (Thunb.) Henry ex Rehd. **J.** *Syagrus schizophylla*(Cham.) Glassman **K.** *Pelagodoxa henryana* Becc. **L.** *Dypsis decaryi* (Jum.) Beentje & Dransf.



Fig. 84: A. *Washingtonia filifera* (Linden) Wendl. B. *Licuala grandis* Wendl. C. *Veitchia merrillii* Becc. D. *Livistona chainensis* (Jacq.) R. Br. ex Mart. E. *Chamedorea elegans* Mart. F. *Thrinax parviflora* Swartz.