Eco. Env. & Cons. 28 (2) : 2022; pp. (768-773)
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ISSN 0971–765X

DOI No.: http://doi.org/10.53550/EEC.2022.v28i02.029

Native Plants Usage in Indian Ornamental Landscaping Scenario: A Review

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(Received 23 July, 2021; Accepted 10 September, 2021)

ABSTRACT

Native plant species have been the part of the local ecosystem and their contribution to fostering the wildlife and other living species is innumerable. However, the manicured landscapes in urban areas vastly boasts of the usage of exotic, introduced plant species in order to beautify them and as a consequence, there has been gradual depletion of native plant species of ornamental values. The commercial nurseries propagate plants which are in demand in landscaping business and hence, scope of conservation in mass scale is also fading. In such a situation, a review has been done about the practical scenario especially in Indian Context. It is undeniable that attempts are being taken in various parts of the world for revival of the native plant species, but not much awareness is observed in India. The Indian gardens are adorned with introduced plants along with very few native ones and the nurseries are propagating plants randomly without knowledge about their ecological significance and origin. Although, research and studies on identification of potential ornamental plants from wild is being done, it is focused in the Himalayas and Western Ghats of India. And not much work was found either on the revival of the native plants which are already established as ornamentals in the landscaped gardens or the newly identified wild species. Hence, there is scope for introduction of those native and wild plant species holding potential as ornamentals into the Indian landscaping scenario for the gain of both the species conservation as well as biodiversity restoration in the urban landscapes.

Key words : *Ecology, Ecosystem restoration, Landscaping, Native plant species, Ornamental plants, Urban landscape Garden*

Introduction

Ornamental landscaping has been a part of human civilization from time immemorial (NCERT, 2019). Patronages of imperials have been the backbone for flourishing of this art. Gradually, the concept shifted to public, societies and communities. In order to boast of being the creator of best of the gardens, unique, exotic plants were brought from different parts of the world, giving the garden one of a kind look. This was the beginning of introduction of exotic plant species.

India has seen influx of various cultures and people and along with these people has come a variety of new plant species (Kenoyer, 1924). The Mughals and the British have huge impacts on this regard. Rose, daffodils, marigold, poppies was first seen in the Mughal Gardens (Roth, 2018). British introduced flowers like Dahlias, aster, Phlox, Verbena (IARI, 2012; Bhattacharjee *et al.,* 2019).

The contribution of these plant species in enhancing the glamour of the Indian gardens is undeniable but with the introduction of these plant species, the native plant species were pushed to the backstage. A native species is one that occurs in a particular region, ecosystem, and habitat without direct or indi-

rect human actions (Richards et al 1998). Though, India has wide plethora of native plant species like *Nelumbo nucifera, Saraca indica, Cassia fistulia, Lagerstroemia indica, Michaelia champaka, Butea monosperma* and many more, (Prakash, 2001) but the introduced plant species became popular fast. With commercialization, the propagation of these introduced exotic species became more profitable as their selling value is much higher. But at the expense of profit, we are losing an invaluable aspect- the native species. Native species and ecosystem are intimately related. An ecosystem with its wildlife grows around these native plant species. The Native plant species have evolved and acclimatized to the local climate and soil over the ages. Hence, smaller flora like moss, fern, lichen and fauna like insects, butterflies, birds and even larger animals found their food and shelter in them (Dorner, 2002). Loss of native plant population is changing the whole ecosystem in that region. The introduction of exotic species of plants and the elimination of native plant varieties like *Justicia adhatoda* and *Lawsonia inermis* has affected the populations of insects like aphids, which are a food source for the sparrow (Dhingra and Singh, 2018). The various afforestation and plantation programs taken up to combat climate change and ecological restoration are planting plant species with knowledge about its origin. Usually, the plants available in the nurseries are being selected for the purpose as because mass collections of other varieties are cumbersome. The plant stocks in the nurseries are based on the demand by the ornamental landscape designers as they are the bulk buyers. So, in between all these issues, the propagation of native plant species gets to the backhand (Karelia, 2021). There are very few nurseries in India who have the collection of native plants species. In fact, very few nurserymen can differentiate between an introduced and native plant species (NFS, 2021). To revive back the ecosystem, the native plant species will have a vital role to play. The practice of using these native plant species specific to the region is necessary for combating species loss as well as for the survival of wildlife in that region.

This scenario is no exception in the urban landscapes also. Sustainability, biodiversity and low maintenance are the main issues underlying the current trends in landscape designing (Müller *et al.*, 2013; Festas, 2014). The urban areas have turned into concrete jungles and patches of green being developed as repose are designed with introduced ornamental plant species. Replacement of these plant species with native ones will not only provide a green city but also attract birds, butterflies and help in rejuvenating the ecosystem. A small instance of this is of Nilgiri Hills, Southern India where environmentalist Mr. Bosco has been trying to revive back the Native landscape and he mentions that in spite of being pushed to the edge by invading plants, there are several pockets of resurgence and native species re-establishing or reclaiming their spaces – though these remain small, they are seeds of hope (Bosco, 2019). Invasion by alien plants (i.e. plant species introduced by humans to regions outside their native distribution) has become very common in cities (Inderjit et al 2018). In this review, we will try to understand the present status of using native plant species in ornamental landscaping and the same in Indian context.

Situation of native plant species usage in ornamental landscaping across the world

It is important to know the opinion of the world regarding the concept first, before we narrow it down to Indian context. Ochoa et al. (2010) stated that native species are of great interest because of their ability to adapt to abiotic stresses (heat, drought and salinity). They developed a guide for use of native species with ornamental value for landscaping and xero-gardening in semi-arid regions via web. It contains information about ecology, nursery production methods and xero-gardening and landscape uses of a wide range of Mediterranean native species, including trees, palms, shrubs and herbaceous perennials.

The Forest Service, U.S. Department of Agriculture (USDA), through its Virtual Center for Reforestation, Nurseries, and Genetics Resources (RNGR), invited Native Americans from across the United States to attend the Western Forest and Conservation Nursery Association annual meeting. There it was agreed that a nursery handbook on growing of Native American plants was needed. The Native plant nursery handbook was published in 2009 and it provided a detailed information on target plants, propagation protocol, growing media, container, hardening, pest management, etc. (Dumroese *et al.*, 2009).

Mashhadani gave a presentation in Middle East Smart Landscape Summit in 2014 on Introduction of Native plants in Landscaping Projects in Abu Dhabi City. He drew attention to the need to refresh and

develop the wild flora to ensure its diversity and recommended to establish a research station for the NPS. He also mentioned the need to spread awareness among people about Native plant species and their significance in ecosystem. All concerned partners (developers, contractors and the owners of nurseries) have to cooperate, by following the correct and safe means, to ensure the success of the transformation to planting of native plants.

Georgia Native Plant Society enlisted native plant species of Coastal Georgia region suitable for landscaping and gardening, habit wise mentioning their growing conditions and market availability status as well (Coastal Wildscapes, 2014).

Montana Native Plant Society published a booklet including recommended native plant species for Montana State, USA along with information regarding local native plant nurseries and seed dealers, agencies and Public Gardens using Native Plants (Jensen, 2005).

A study by Mohamad *et al.* (2013) in Malaysian Tropical rainforest, aimed at investigating the significance of ornamental plant as birds' food and cover in forest parks. The findings established that native species provide better food plants for urban birds and reaffirm that forest parks should cater for both human and bird habitats through selection of native plants; and be adopted as an urban conservation strategy.

Diekelmann and Schuster (2002) introduced native plant species for grasslands, forests, edge areas, and small wetlands of northeastern United States and eastern Canada and discussed natural landscaping for public parklands, civic buildings, school grounds, and corporate properties.

However, Hoyle *et al.* (2017) conducted a survey on public perception of non-native planting in the designed urban landscape and found that majority (57.6%) of the respondents would be happy to see more non-native planting in UK public spaces, rising to 75.3% if it were better adapted to a changing climate than existing vegetation. Their research indicates that in the context of a changing climate, focus should be placed on the potentially positive role of non-invasive, climate-adapted, aesthetically pleasing species within urban planting schemes as these could be well-received by the public. But Ramesh (2018) mentioned that the general practice of planting exotic trees in an effort to make them grow sustainably came to be considered a failure as seen in Nilgiri and Ooty hills scenario of Western Ghats, India. Now Eucalyptus and tea are the only species that can be planted despite the water thirsty character of eucalyptus causing depletion of water levels in springs, rivers.

Scenario of ornamental plant species used in ornamental landscaping in India

Patel et al. (2018) conducted a study on Ornamental Plants in various public parks and gardens in Ahmedabad, Gujarat, India. The species recorded were admixture of native and introduced species. Introduced species like Poinsettia (*Euphorbia pulcherrima*), *Althea sp.*, *Lantana camara*, *Passiflora alata*, *Calliandra haematocephala* were prevalent in the gardens.

In another biodiversity and plant distribution study in urban Bangalore by Madhumitha and others (2012), the overall plant diversity in the city was high but majority if the species were uncommon. They also stated that there is limited information currently available on urban domestic gardens outside of cities in the west. The study also observed that large proportion of respondents have observed a decrease in wildlife biodiversity over time, especially in visits by sparrows, snake, monkeys, snails and frogs.

In a webinar on Native Plants in Landscape- Opportunities for Indian Nurserymen (2020), Prasannamurthy Desai, a Landscape Architect, highlighted the scarcity of quality native plant species planting material for landscaping. He stated that no nursery in India could supply native trees for a particular biodiversity zone in quantity more than thousand. This realistic scenario portrays the scope for exploitation of native plant species in India (Desai, 2020).

Wild ornamentals plants with potential landscaping use in India

Work on information on native plant species suitable for landscaping in India is in its nascent stage. Much more experiments on introducing these species into landscape design have to be taken up. So, that the public come to realize the beauty of the native species along with its ecological significance. The first step towards that is finding out the potential native plant species suitable for landscaping.

Reddy *et al.* (2015) studied potential wild ornamental species of Convolvulaceae family in Eastern Ghats of India. They identified 61 Plants belonging to 11 genera and systematically described them with

digital images in electronic herbarium.

Kumar *et al.* (2015) documented some ornamental plants found in Himachal Pradesh, Northern India but their origin has not been discussed.

Babu *et al.* (2017) also identified wild ornamental plants of 153 species from 112 genera and 48 families which have attractive plant growth habit and beautiful flowers from Palakonda hills of Eastern Ghats in Andhra Pradesh, India. They identified maximum species of herbs, followed by Creeper and climbers, shrubs, trees and epiphyte.

Some 30 species of wild grasses belonging to chasmophytic grass taxa were collected by Thomas *et al.* (2012) from Velliangiri Hills of southern Western Ghats of Tamil Nadu, Southern India.

Sharma and Rana (2000) identified some plants endemic to Himalayas which have potential as landscaping plants including *Rosa moschata, Lilium bulbiferum, L. longiflorum, Eremurus himalaicus* among others.

Manipur Himalayas harbours great plant diversity including rare orchids, Rhododendrons, wild roses, ferns, wild azaleas totaling to about 150 species. Out of 1300 reported orchid species in India, 700 are found in Himalayas of north-eastern India (Hore, 2001).

Baidya *et al.* (2016) studied the importance of parks in urban landscape in hosting biodiversity. They collected data from 30 urban parks in North and South Bengal of Eastern India and found 805 species of plants and 607 species of animals in those parks while movement of 6 faunal species were found to be restricted within the urban parks of North Bengal and that of 15 in the urban parks of South Bengal.

Chitale *et al.* (2014) predicted the future distribution of 637 endemic plant species from three biodiversity hotspots in India; Himalaya, Western Ghats, Indo-Burma and concluded that regions with cooler climates and higher moisture availability could serve as refugia for endemic plants in future climatic conditions. Such adversity can be prevented if we start acting now and try to conserve the endemic species in their natural habitat.

Amphan cyclone, one of the most powerful cyclones of the decade risen from Bay of Bengal has left the city of Kolkata, the metropolitan city of eastern India in shambles in respect of tree population. In 2020, the cyclone had hundreds of trees fallen everywhere in the city. This has left the environmentalist and urban development department thinking the cause of such incidence. Eminent environmentalist opined that random plantation of trees without taking into account the adaptability of the species to that environment has been one of the major causes for weaker root system and hence toppling of the trees. They also suggested the replanning of the city scape with native plant species for better stability and of course biodiversity enhancement (Mitra, 2020).

Cowen (1970) had vividly described some trees and shrubs species of India which has originated or widely distributed in India. The list of plants included *Delonix elata, Butea monosperma, Saraca ashoka, Bauhinia purpurea, B. tomentosa, Bombax malabarica, Erythrin indica, Millingtonia hortensis, Cassia fistula, Ficus bengalensis, F. religiosa* and others.

Conclusion

Urban green spaces constitute one of the few remaining locations for a large proportion of the world's increasingly urbanized population to observe and interact with nature. City vegetation has a key role to play in providing ecosystem services, and maintaining social well being in crowded, stressful urban environments (Botkin and Beveridge 1997; Aminzadeh and Khansefid 2010). Urban gardens can be very important at a coarse scale, acting as networks to support biodiversity, particularly of mobile taxa such as birds (Goddard et al. 2010). The impact of exotic vs. native plant species on faunal diversity is less clear however—while in Phoenix, Arizona, increase in the number of trees and shrubs has been linked to an increase in native bird richness (Lerman and Warren, 2011).

In this backdrop, the documentation of native plant species in ornamental landscape and their contribution to ecosystem restoration has to be done in more dynamic way. But, before that the conservation of these native plant species has to be done both in government and commercial basis. Globally, plant germplasm conservation effort is continually focused on food and industrial crops. International agencies including IPGRI and FAO have no mandate to conserve ornamental crops (Pedapati et al, 2018).

Dhingra and Singh (2018) suggested that laws should be adopted for growing native plants. Certain measures like promoting or requiring the growth of appropriate plant varieties should be adopted in the Biodiversity Act 2002. Hardly any

research or study on the native trees used in landscaping in India has been documented. Out of the 20 agro-ecological zones, the options of potential ornamental wild plants have been studied mainly in the Himalayas, Western and Eastern Ghats. The rest of the agro-ecological zones as such remain unexplored. Furthermore, the introduction of native plant species has reached the 1st stage, i,e., identification of plants suitable for landscaping and their documentation. The germplasms are being conserved in Botanical Survey of India, few Govt. institutions like NBPGR, nurseries in limited scale and in few personal collections. But the drive of their commercial propagation in various nurseries across the country is lacking. This may be due to lack of demand of those native plant species, which again is dependent on the landscaping business. If some progressive landscape designers start incorporating native plant species in their designs, the rest can follow and the demand will increase at the same time. Otherwise, a time will come when we might have to view those beautiful plants only in the digital images and videos only and never get to experience there beauty in reality. Furthermore, the local wildlife greatly depends on these plants for their food and shelter, promoting native plant use in urban landscape plantation would certainly contribute to their survival.

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