

Wild ornamental plants for sustainable landscaping

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Abstract

Naturally flourishing flora has an important role to play in achieving the goal of sustainable landscaping. In the modern world of increasing urbanisation and changing environment man made landscapes are thriving for adaptation where wild or native plants can be exploited for better use. Many studies has been done related to exploration and identification of wild plant resources with striking ornamental character and growth potential which further need to strengthened. In this review attempt has been made to highlight the importance of wild ornamental plants in landscaping along with the need of exploration and their conservation,

Introduction

Natural landscapes consisting of undisturbed resources of lush green native flora always appeals the eye and imitation of those landscapes is difficult which is often done by choosing different species which suits the natural climate and edaphic conditions. Introduction of species to different areas for the purpose of landscaping is very important with added advantage of increasing diversity and beautification but if it comes to sustainability many times different introduced species fails to survive or sometimes it surpasses the natural vegetation of the region and become invasive. Apart from that, process of introduction, acclimatization and exploration of landscape value demands a lot of investment which increases the economics of landscaping which is not sustainable in long run. So in order to increase beautification and make landscaping a sustainable venture, wild ornamental plants or native plants flourishing in natural conditions can be explored and included in the landscape programmes. Native plants possess huge potential as explored and documented by many researchers for their multiple uses and commercial values. Our Indian subcontinent is very rich in plants diversity with certain plant species endemic to particular region. We have 15,000 species of flowering plants which are distributed in different phytogeographical regions of the country from coastal plains to the alpine Himalayas (Jain, 1983). This plant diversity has been categorised as tropical evergreen, tropical deciduous, subtropical, desert, temperate, alpine and sub alpine vegetations. Though there are many reports on exploration of wild species and out of that numerous species has been well documented for their potential uses and has been commercialized. But thorough research is still needed to explore the plants for their multiple uses like the landscape value for those species with have ornamental traits like flowering, leaf color, stem color, plants form or any other trait subjected to aesthetic aspect. Aesthetic potential of the wild species can be correlated to the economic potential as these species can be used as cut flowers, loose flowers, flower arrangements, avenue planting and as commercial landscape plant and this can be supplemented with thorough research on morphological and physiological attributes of plants (Zickel and Dias, 2018).

Need of conservation:

Due to the rapid developmental activities, deforestation has increased worldwide and natural habitats which possess enormous explored and unexplored diversity are under threat of destruction. Globally deforestation is estimated to be 16 to 20 million ha every year which implies that near about 60,000 plants will be struggling for their survival or will be at the verge of extinction in the coming 30-40 years. This data increases our fear of losing potential and valuable resources for various purposes such as economic, medicinal or ornamental (Prakash and Peirik, 2012). In India alone approximately 2,500 plant species which constitutes 15-20 % of the total vascular flora are under various degrees of endangerment (Jain, 1987). Among the flowering plants reported from India, one-third is considered endemic in the Western Ghats. Among many endangered ornamental species there are valuable orchids which possess remarkable keeping quality as cut flower and other landscape uses. Besides that their unique medicinal properties require them to be conserved on priority basis. From Indian continent, approximately 1220 orchid species have been reported constituting 300 rare species, 150 endangered and 37 with immense medicinal value (Dey and Medhi., 2014). Conservation is an important step in order to sustain specifically in case of food crops and the species which are endemic, endangered or threatened. But with huge economic and aesthetic potential exploration will be an important step for conservation of wild ornamental plants. Worldwide, Out of the total germplasm collection which exceeds 6 million accessions, in 1400 genebanks, less than one percent is occupied by ornamental herbaceous species even in the countries which much diversity (Chin and Tay, 2007). Effort towards the conservation of ornamental plants has been taken in November 2001 International Treaty (IT) on Plant Genetic Resources for Food and Agriculture which provide a set of common implementation protocols for ABS (germplasm access and benefit-sharing). In this features suitable for application in ornamental plant species have been identified and evaluated in relation to the current intellectual property rights protection methods (Tay, 2005).

Exploration and identification of wild ornamental plants:

Our country harbours about a total of 47,513 plant species and about 28% of plants that occur are endemic to the country. With huge floristic diversity available with us we still are not fortunate as people are not aware of this rich diversity and are unknowingly involved in habitat destruction through developmental activities. Plant species with intrinsic value needs to be protected and explored for the benefit of our future generations. Present day commercialized ornamental plants are mostly evolved from wild progenitor a few of which still flourishing in their natural habitat (Thomas *et al.*, 2011). Reddy *et al.* (2015) explored potential wild ornamental species of Convolvulaceae, which are identified and documented from Eastern Ghats of Andhra Pradesh, India. They identified 61 Plants belonging to 11 genera presented in electronic herbarium. In their exploration climbers dominated followed by herbs, vines, shrubs and liana. As per their studies they outlined opportunities for using these plants in indoor and outdoor landscaping. Ornamental climbers have been explored and well documented for their use (Gentry and Dodson, 1987; Wright *et al.*, 2004). Climbers are mostly found in rain forest which greatly varies according to geographic locality of forest (Grubb, 1987). Another exploration study on wild ornamentals documented from Palakonda hills of Eastern Ghats in Andhra Pradesh, India identifies

153 species from 112 genera and 48 families which have attractive plant growth habit and beautiful flowers. In this study maximum identified species belonged to herbs, followed by Creeper and climbers, shrubs, trees and epiphyte. Major families were Convolvulaceae followed by Fabaceae and Apocynaceae and among dominant genera it were *Ipomoea*, *Jasminum*, *Indigofera*, *Euphorbia*, *Argyrea* and *Barleria* (Babu *et al.*, 2017). Botanical exploration and investigation of wild vegetation of YSR district in Andhra Pradesh has been conducted by Reddy *et al.* (2012). Abundant diversity of wild ornamental plants in terms of taxa, habit and growth forms were found. Total 356 species belonging to 246 genera and 105 families with potential aesthetic value has been listed. On analysis and evaluation, prominent ornamental trait found to be was flowering and some with ornamental fruits and foliage. Earlier Madhusudana Rao (1989) mentioned 25 species of horticulture interest through their exploration studies on flora of YSR district. Thomas *et al.* (2012) documented and collected 30 species of wild grasses which belongs to chasmophytic grass taxa belonging to 26 genera from Velliangiri Hills of southern Western Ghats of Tamil Nadu. This presents the unique opportunities for exploring the potential of these grass taxa in special gardens like rock garden, xeriscaping as these plants adapt in the extreme ecological conditions such as extreme temperature fluctuations, hardness of the substrate, limited resources which are the characters required in the plants suited for landscaping in unusual or harsh conditions (Nagy & Proctor 1997). Exploration studies carried by Kensa *et al.*, (2014) indicated abundance of ornamental plants with wide diversity in plant growth. Out of 61 angiosperms present, 13 % annuals, 4.9% Gymnosperms, 6.5% palms, 8.1 % Pteridophytes, 4.9 % Biennials, 19.6 % Perennials, 11.4%, Shrubs, 16.3% Climbers, 8.1% Succulents and 6.5 % Cacti were categorised. Asteraceae was found to be the dominant family with beautiful flowering plants suitable for many landscape uses followed by Liliaceae, Convolvulaceae, Cactaceae and Arecaceae. This wide diversity with different plant species is very much suitable for indoor gardening, outdoor landscaping, xeriscaping and even as cut flowers which can be explored well by complete evaluation.



Fig1: *Sporobolus indicus* (L.) R. Br. var. *flaccidus* and *Arundinella pumila* (Hochst. ex A. Rich.) Steud (Thomas *et al.*, 2012).

Wild ornamental plants of himalayan region:

There are many potential plants in Indian Himalayas which are endemic to this region and possess multiple landscape value which includes, *Rosa moschata*, *Lilium bulbiferum*, *L. longiflorum*, *Eremurus himalaicus*,

Primula denticulata, *P. rosea*, *Nelumbo nucifera*, *Tulipa stellata* and *T. aitchisonii*. Some of the species of *Lilium* viz., *L. nepalense*, *L. polyphyllum*, and *L. wallichianum* have originated in Himalayas (Sharma and Rana, 2000). A rare liliaceae species with immense regional significance, *Lilium Mackliniae*, commonly called Shirui lily is endemic to higher elevations (1,730–2,590 metres above sea level) of Shirui hill ranges in the Ukhrul district of Manipur, India. Apart from this rare species this region of Manipur Himalayas possess great plant diversity in wild which flowers throughout the year including rare orchids, Rhododendrons, wild roses, ferns, wild azaleas totalling to about 150 species. Himalayan Regions are also rich in major temperate grasses which offer significant diversity and possess landscape value such as, *Agrostis*, *Agropyron*, *Dactylis*, *Elymus*, *Festuca*, *Lolium*, *Phalaris*, *Phleum* and *Stipa* (Bore, 1960; Babu, 1977; Singh and Misri, 1994). North eastern Himalayas are rich in diversity specifically out of 1300 reported orchid species in India, 700 are found in Himalayas of north-eastern India (Hore, 2001).

Potential uses of wild ornamental plants:

***Reinwardtia indica*:** It is low growing shrub belonging to the family linaceae. It is also known as basanti or spring flower as blooms in spring or marks the onset of spring. It is distributed globally in the regions of India, Pakistan, Nepal, Bhutan, Myanmar, Thailand, Indo-China and China. It possesses many medicinal benefits such as applied in injuries, in measles, roots as abortifacient (Thakur and Sidhu, 2014) and many research studies have been done on phytochemical analysis of the plant to explore its medicinal potential (Thakur and Sidhu, 2014). The yellow dye is made from flower which is used for dyeing the clothes and making paints. Apart from immense medicinal importance this particular plant bears beautiful yellow flowers and is hardy under minimal conditions. To make sustainable landscapes the varietal diversity can be explored in this plant and can be included in sustainable landscape programs.

***Meconopsis betonicifolia*:** From the family *Papaveraceae*, commonly known as Himalayan blue poppy is strikingly beautiful wild ornamental plant bloom during summers in Himalayas. Flowering comes in profusion that it covers the entire patches. It is native to the Himalayas, northern Burma, Tibet and Yunnan Province in China. It naturally grows in shady mountain ranges, meadows, slopes and woodlands. This plant has been explored for medicinal properties as contains terpenoids, phlobatannins, flavonoids and alkaloids (Ahmed *et al.*, 2016). In a study related to flower color development in Himalayan blue poppy revealed that blue pigment in *Meconopsis* should be a new type of metal complex pigment indicating the involvement of ferric ions (Yoshida *et al.*, 2006). Though scientific research on different aspects has been done on this wild plant but landscape value has still need to be explored with much efforts towards plant conservation and multiplication.



Fig2: *Reinwardtia indica*, *Meconopsis betonicifolia*, *Primula denticulate*, *Rosa brunonii* (Source: <http://www.greathimalayanoutdoors.com/himalayan-flora-fauna>)

***Primula denticulata*:** Commonly known as wild primula or drumstick primula belonging to the family primulaceae is a showy and locally abundant species. It is found across the Himalaya ranging from Afghanistan to China. For the first time it was reported in Nepal. It naturally occurs in the moist parts of the hills and comes in bloom during February to April. Many local selections have been made from this wild plant due to its suitability as potted plant, bedding plant or for other landscape uses. China, specifically Western Sichuan is considered to be the major diversity centre for the genus *Primula*, constituting about 300 species out of the total 430 species in the world. In a study conducted on distribution, classification, and evaluation of the *Primula* species collected from western Sichuan, 29 species, four subspecies, and one variety were collected, identified, and classified. Different flower colors within the same species were also found. *Primula* resources based on their. The results indicated that *P. denticulata* subsp. *sinodenticulata* represented highest ornamental value, utilization potential, and ecological adaptability which presents the potential for sustainable exploitation. Other species also showed better potential for exploitation and utilization of wild *Primula* resources (Jia *et al.*, 2014).

***Rosa brunonii*:** Himalayan musk rose from the family rosaceae is the one of the important species in genus *Rosa* and there are about 25 species in *Rosa* which inhabits in the wild and have contributed in the development of modern day roses. Adaptability of wild roses is superior in comparison to modern roses and they are the potential source of many genes governing the quality traits (Riaz *et al.*, 2007). Himalayan musk rose is an important source of essential oil and other products like rose water. Fifty-two constituents were identified in essential oil viz; eugenol, geraniol, n-heneicosane, n-nonadecane and α -pinene whereas in rose water extract the major constituents were eugenol, geraniol, phenyl ethyl alcohol, n-heneicosane and n-tricosane (Verma *et al.*, 2016).

Conclusion: With such great diversity and enormous potential, our country can become sustainable in terms of efficient utilization of natural resources specifically in field of native or wild ornamental plants. Thorough exploration work is needed in order to tap the valuable diversity available and further it should be strengthened with the standardization of their propagation methods and technical knowledge about their cultivation. This will be great step towards their conservation, attaining sustainability and creating picturesque landscapes.

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