National Conference on Recent Trends and Developments in Environmental and Basic Sciences (RTDEBS-2018)
Organized by, Faculty of Science In collaboration with
Internal Quality Assurance Cell (IQAC), Dr. S. D. D. Arts College &
Commerce & Science College, Maharashtra, India. Association with
International Journal of Scientific Research in Science and Technology
 | Volume 4 | Issue 3 | Print ISSN: 2395-6011 | Online ISSN: 2395-602X

Genetic Diversity and Collection of Bamboo: an Approach for The Ex-Situ Conservation in A Narrow Geographical Range of Central Forest Nursery Wadali, Amravati.

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ABSTRACT

India is home to a colossal band of bamboos resources. Bamboo is an important genetic resource provide lively hood for millions of people around globe. Due to increasing populations pressure, industrial demand, indiscriminate cutting resulted in the overexploitation, burning cultivation which is common practice in North East States of India has been resulted in the genetic erosion of several bamboo species. This has driven the attention of various organizations for this ecological, economic and social resource. An amalgamated approach to collect characterize and conserve bamboo has been put forward in Central Forest Nursery Wadali Amravati. This collective approach has bought together a number of bamboo species from different area of country. Fifty two species representing thirteen genus are present in the forest nursery. A master characterization manual has been prepared according which all the species have been fully characterized. These species presents a variation among the bamboo at species as well as at generic level. This germplasm may act as a soul resource for further development, research and sustainable management of bamboo resource in this particular area.

Keywords: Germplasm, Bamboo, Conservation

I. INTRODUCTION

India is home to 145 species representing 23 genera of bamboos (INBAR, 2005), which covers about 17 % of total forest (Lobovikov, 2007). North-Eastern states and Western Ghats contributes more than 66% of total bamboos resources available in India (Sarmah et al., 2000; Rai and Chauhan, 1998; Sharma and Richa, 2002). An estimated annual bamboo demand in india is 5 million tones during the recent past (Das et al. 2005). Maharashtra is one of the least bamboo diverse states in india. Three major bamboos species found in state are viz Bambusa bambos, Dendrocalamus strictus, Pseudoxytenanthera species and estimated area under bamboo occupation would be 0.85 million hactiors (Tewari, 1992).

As commonly found in moister habitats in old-growth forests bamboos are intrinsically vulnerable to deforestation. Restricted potential range is shown by various Asian bamboo species, probably due to poor dispersal mechanisms as well as low seed setting rate and segregation of populations in dissected, terrain, mountainous. This insinuates that many uncultivated

forest bamboos may be predominantly susceptible to loss of habitat, and erosion of their genetic diversity and may become threatened (Bystriakova et al. 2003). Being a versatile and renewable resource bamboo has been overexploited to such an extent that concern is being expressed over the erosion of this gene pool (Renuka, 1996). Apart from mundane flowering, overexploitation influences regeneration of bamboo in their wildness and tender shoots some edibale are consumed over a prolonged time is a probable reason for decrease in population of germplasm (Hore, 1998).

Absence of quality planting material and continued supply of bamboo to paper and pulp industry has significantly affected the lively hood of the humans. Such continued extraction could also be limit the natural regeneration potential, perhaps threatening their survival, therefore, conservation of this valuable gene pool is of prime importance. Preservation of bamboo germplasm has become necessary not only for conservation and collection but also for the classification and characterization because of prevailing worldwide overexploitation and genetic erosion of this gene pool (Bahadur 1979). Germplasm characterization is an important link between the utilization and conservation. Study of the local distribution and investigation of bamboo resource is important to maintain the germplasm for the conservation of biodiversity (Goyal et al., 2012), which is recorded to be limited till date. Therefore, conservation is important for the valuable utilization within the country as well as for exports to south Asian countries to earn the foreign exchange.

II. METHODS OF COLLECTION

Reproductive propagation in bamboo is not usual because of monocrpic nature and long term flowering in bamboo. Flowering is a peculiar feature of bamboos which is a cyclic phenomenon and the cycle varies between 3-120 years which depends on the species (Janzen, D.H., 1976; Tewari, 1992). Owing to such a reason bamboo propagation depends on vegetative plant body. Each species was collected from a particular region with the help of an expert having sufficient knowledge about that specimen. Either rhizome or Culm cuttings with node were collected and brought successfully to Central Forest Nursery, Wadali, Amravati. All this is done at a specific time during the months of March to May which is the best period for taking cuttings. Culm segments were cut with a sharp knife or saw keeping 5–10 cm on either side of the node. The cuttings were transported to the propagation bed as early as possible. Depending up on the length of the internodes the segment can be 1–2 or 3 noded. If the cuttings were two or more noded, approximately 2 cm long and 1 cm wide opening was made in the centre of the internode. A particular concentration of hormones was given before the plantation. Usually Gibberlic acid with a concentration of 200 ppm was used. Regular maintenance, multiplication was carried out following the yearly plan guide. The identification has been done by using various authentic resources such as official material housed in the nursery and various other books and literature available on different related websites and by the help of different experts.

III. RESULT AND DISCUSSION

Conservation of bamboos in India is practiced like other higher plants both in-situ and ex-situ by traditional methods with the aim to harness the potential of bamboo crops in country. The ex-situ conservation of bamboo species is an ideal example. Under such a kind of ex-situ conservative program a significant number of bamboo species representing various genus of bamboos have been conserved and diversified. A total number of thirteen genus including: Bambusa, Dendrocalamus, Dinochloa, Gigantochloa, Guadua, Melocanna, Ochlandra, Oxytenanthera, Pseudsas, Pseudoxytenanthera, Phyllostachys, Schizostachyum and Thyrsostachys have been collected from different parts of country. These

genus include different species such as Bambusa with sixteen species genus Bambusa include the highest number of species whish are Bambusa affinis Munor, Bambusa assamica Barooah & Borthakur, Bambusa balcooa Roxb, Bambusa bambos (L.) Voss, Bambusa bambos (L.) Voss, Bambusa cacharensis R. B. Majumdar, Bambusa jaintiana R.B.Majumdar, Bambusa burmanica Gamble, Bambusa longispiculata Gamble, Bambusa multiplex (Lour.) Raeusch. ex Schult., Bambusa multiplex f. alphonsekarrii (Mitford ex Satow) Nakai, Bambusa nutans Wall. ex Munro, Bambusa nana Roxb., Bambusa oliveriana Gamble, Bambusa pallida Munro, Bambusa teres Munro, Bambusa tulda Roxb., Bambusa polymorpha Munro, Bambusa vulgaris Schrad., Bambusa ventricosa and Bambusa vulgaris var. striata (Lodd. ex Lindl.) Gamble . Genus Dendrocalamus includes ten species is the second largest genus. Species described and conserved under this genus are :, Dendrocalamus brandisii (Munro) Kurz, Dendrocalamus giganteus Munro, Dendrocalamus somdevae H. B. Naithani, Dendrocalamus calostachyus (kurz) kurz, Dendrocalamus longispathus (Kurz) Kurz, Dendrocalamus asper (Schult.)Backer, Dendrocalamus membranaceus Munro, , Dendrocalamus hamiltonii Nees & Arn. ex Munro, Dendrocalamus sikkimensis Gamble ex Oliv. and Dendrocalamus strictus (Roxb.) Nees. Genus Gigantochloa includes five species such as Gigantochloa atter (Hassk.) Kurz., Gigantichola albociliata (Munro) Kurz. Gigantochloa atroviolacea Widjaja, Gigantochloa macrostachya Kurz and Gigantochloa rostrata K.M.Wong. Genus Phyllostachys having four species which includes Phyllostachys assamica Gamble, Phyllostachys aurea Rivière & C.Rivière, Phyllostachys edulis (Carrière) J.Houz., Phyllostachys mannii Gamble and Phyllostachys nigra (Lodd. ex Lindl.) Munro. Genus Schizostachyum having four species are Schizostachyum brachycladum (Kurz) Kurz, Schizostachyum dullooa (Gamble) R.B.Majumdar., Schizostachyum pergracile (Munro) R.B.Majumdar and Schizostachyum polymorphum (Munro) R.B.Majumdar. Genus Ochlandra having three species which are as Ochlandra ebracteata Raizada & Chatterji, Ochlandra scriptoria (Dennst.) C.E.C.Fisch., Ochlandra travancorica (Bedd.) Gamble, Genus Dinochloa including two species which are Dinochloa macclellandii (Munro) Kurz., and Dinochloa andamanica Kurz. Genus Oxytenanthera having two species which are Oxytenanthera abyssinica (A.Rich.) Munro and Oxytenanthera parvifolia Brandis ex Gamble. Genus Pseudoxytenanthera having two species which are Pseudoxytenanthera ritcheyi (Munro) H.B Naithani and Pseudoxytenanthera stocksii (Munro) T.Q.Nguyen. Genus Thyrsostachys include two species which are Thyrsostachys oliveri Gamble and Thyrsostachys regia (Munro) Bennet. All other three genus having only a single species. Guadua angustifolia Kunth., Pseudosasa japonica (Steud.) Makino and Melocanna baccifera (Roxb.) Kurz.

The primary vital step in conserving and organizing threatened species is exact identification and delimitation of the particular species (Amaral, W., 2004). This germplasm constitutes one of the 12 rear and endangered bamboo species of India. Different training programs are also been conducted in concern with the conservation and diversification of bamboos in the vidharba region. Multiplication and diversification of bamboos are being conducted under a well planed annual program. Every year new species are being added to the germplasm.

Sharma, M.L. and Nirmala, C., 2015, placed Maharashtra state at 19th position in bamboo diversity with number of species 7 + 1 Var. An effort has made to gather the valuable germplasm of bamboo focused on the conservative and commercial values. Bamboo being one of the fastest growing grass and can proved to be an alternative crop for the barren areas. Identification on basis of morphological character in case of bamboo is so random and isn't considered as compatible one. Vegetative character based genetic

relatedness and phylogenetic relationship of eighteen bamboo species from central forest nursey wadali Amravati has reported (Khanday, AH., 2015). This huge germplasm also plays a key role in comparative identification of some particular species. Furthermore the work on molecular phylogenetic aspects of bamboos from this particular area has already been carried on, so this may be helpful to correlate the bamboo relation with other species and with the possible near vegetation. Molecular marker based assessment may help in identification of species so that to remove the ambiguities of identification. DNA barcoding is a potential technique to overcome these identification challenges (Hebert, P.D., 2003).

IV. CONCLUSION

This conservation program works as a stepping stone, an approach for the conservation and identification of flora particularly bamboos. It was a projected view to multiply and to produce the potentially fastest growing bamboos for commercial purpose. This is also being used as a destination to attract the attention of people. The main focus of present the work was to let the people know about this huge collection and conservation approach. This will not only assure the availability of this important natural resource in near future but also will help in understanding the ecology and improving for higher productivity.

V. ACKNOWLEDGEMENT

This work was made possible because of technical support given by Smt. Ninu Somraj, IFS, Deputy Conservator of Forests (Territorial), Amravati Division, Maharashtra Forest Department, Government of Maharashtra.

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