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Original Research Article

Diversity of Climber and Creeper Medicinal and Aromatic Plants with Special Reference to Their Regeneration in Herbal Garden for *Ex-situ* Conservation

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Abstract

Plants are remarkable source of valuable substances for human beings. These are showing variation in their habitat as well as their habit. As per climatic conditions, the plants are showing their presence in different sites. Some plant species which are climbing and creeping in their tendency are referred as climbers and creepers. A climber plant includes tendrils and creepers having adventitious roots on nodular part of the stem helpful for their climbing and creeping on any substratum. In present study 37 species of climber and creeper plants having medicinal and aromatic properties were selected, and were collected from various parts of Chhattisgarh State, India. These were regenerated in Herbal Garden (in poly bags and prepared beds) for increase their population further and for *ex-situ* conservation.

Keywords

Climber

Creeper

Medicinal and aromatic plants (MAPs)

Ex-situ conservation

Herbal garden

Introduction

Climbers are weak stemmed plants (Dutta, 1689) showing variations from trees and shrubs which are self supported plants. These are different in their mechanical characters (Isnard et al., 2009), well adopted to climb on any support like large trees. Suitable modifications for mechanical support *viz.*, hooks, tendrils and roots in modified forms are found in these kinds of plants.

India is a rich center of biodiversity with important hot spots, Western Ghat and Eastern Himalaya. Climbers and creepers are important components of plant diversity and are also valuable for their medicinal uses, nutrient recycling, etc. (Schnitzer and Bongers, 2002). The climbers are rooted in soil but need for a support to their weak stem (Richards, 1952). *Ex-situ* conservation of climbing plants are very much needed with reference to their roles that they play. Recent study conducted at University of Agricultural Sciences, Bangalore, Karnataka is an example of *ex-situ* conservation of climbing plants (Rajkumar and Rajanna, 2011).

The climbing plants in tropical forests of southern Eastern Ghats, Tamil Nadu (Muthumperumal and Parthasarathy, 2009), useful climbers of Fatehpur, Uttar Pradesh (Agarwal, 2013) and diversity and distribution of climbers in semi-deciduous rain forest (Ghollasimood et al., 2012) provides the knowledge on climbing plants. Patel et al. (2013) focused on climbers in urban set up-Ahmedabad and Gandhinagar.

Many climbers and creeper plants are found to be useful for treatment of various disorders. Curative climbers of Maruthamalai hills in the southern Western Ghats of Tamil Nadu, India have been reported by Sarvalingam et al. (2011). Suthari et al. (2014) reported the climbing plants of northern Telangana in India and their ethno-medicinal and economic uses. Diversity and status of ethno-medicinal plants of Almoda district in Uttrakhand, India was assessed by Kumari et al. (2011). Indigenous uses of medicinal plants in North Garo Hills, Meghalaya, NE India was noticed recently by Sharma et al. (2014).

Some important studies on diversity of climbers in different parts of India by Gentry (1991), Ghosh and Mukherjee (2006), Bandopadhya and Mukherjee (2010) and, Jangid and Sharma (2011) suggest that the climbers are forming main components of ecosystem. The conservation of important and endangered medicinal plants, their conservation and the ethnomedicinal uses, including climbers is very essential to establish their appropriate utilization (Mahajan, 2006; Ajaib et al., 2012; Singh et al., 2013). The present study is aimed to investigate the climber and creeper plants having medicinal and aromatic properties from various parts of Chhattisgarh State, India and to propagate them in herbal garden as a mean of *ex-situ* conservation.

Materials and methods

Plants or useful parts of Medicinal and Aromatic Plants (MAPs) of the category climbers and creepers were collected from different parts of the Chhattisgarh State, India and were identified with the help of local floras. Climbing and creeping MAPs showing variation in their habit like herbaceous and shrub/climber/creeper were considered for the present study. The collected plants were subjected to propagation in Herbal Garden in the campus of Guru Ghasidas Vishwavidyalaya, Bilaspur for *ex-situ* conservation.

According to the propagative nature of the climber and creeper MAPs, they were subjected to propagation by seeds, stem cuttings, tuber or seed/stem cutting modes. The mature disease free seeds and other parts useful for their propagation were collected for further multiplication purpose. New individuals were developed using seeds or by vegetative modes and some of the plant species were up-rooted and directly introduced in to the Herbal Garden.

Plant propagation was done in poly bags as well as in the prepared beds. The plant parts used for further propagation in poly bags were transferred after their maturation, in selected beds following fulfillment of water and other requirements. The climbers/creepers developed in poly bags were transferred in to the field by providing facilities to the newly developing MAP individuals.

Results

There were 37 species of climbers/creepers of the MAPs were collected and introduced in the Herbal Garden for propagation and for *ex-situ* conservation and are listed in Table 1 with the details on their common name, botanical name, family, habit and the propagation mode of each plant.

Family-wise distribution of climber/creeper MAPs followed by their habits is given in Table 2. A maximum of five plant species of family Convolvulaceae were introduced in to the Herbal Garden, followed by four species of the family Cucurbitaceae and three species of family Piperaceae. Rest of the plant species belonging to 17 different families were intermediately regenerated and conserved in the Herbal Garden.

Mode of MAPs regenerated in the present study has been recorded and are shown in Fig. 1. The mode of propagation of climber and creeper MAPs differed and 18 species of plants were registered to multiply by their stem cuttings. Secondly, the seeds were found to be suitable for multiplication which accounted for 10 plant species and rest of the plants studied were multiplied by using their seed/stem cutting, and tuber/stem cutting.

Table 1. Climber and creeper Medicinal and Aromatic Plants (MAPs) and their regeneration in Herbal Garden.

Common name	Botanical name	Family	Habit	Propagation	Mode of multiplication
Air potato	*Dioscoria bulbifera* Linn.	Dioscoriaceae	Herb/ Climber	Tuber	Poly bags
Air potato	*Dioscoria alata*. Linn.	Dioscoriaceae	Herb/ Climber	Tuber	Field
Anantmool	*Hemidesmus indicus* (Linn.) R. Br.	Asclepiadaceae	Herb/ Climber	Stem cutting	Poly bags
Angur	*Vitis vinifera* Linn.	Vitaceae	Shrub/ Climber	Stem cutting	Poly bags
Aparajita	*Clitoria ternatea* Linn.	Fabaceae	Herb/ Climber	Seed	Field
Canyon morning glory	*Ipomoea barbatisepala* A. Gray	Convolvulaceae	Herb/ Creeper	Stem cutting	Poly bags
Canyon morning-glory	*Ipomoea barbatisepala* A. Gray	Convolvulaceae	Herb/ Creeper	Tuber/ Stem cutting	Field
Cardinal creeper, Cardinal vine, star glory Raighai	*Ipomoea quamoclit* L.	Convolvulaceae	Herb/ Climber	Seed	Poly bags
Climbing Spinach	*Basella rubra* Linn.	Basellaceae	Herb/ Climber	Seed/ Stem cutting	Field
Coccnia wild	*Diplocyclos palmatus* (L.) C. Jeffrey.	Cucurbitaceae	Herb/ Climber	Seed	Poly bags
Flame vine	*Bignonia venusta* Ker-Gawler	Bignoniaceae	Herb/ Climber	Stem cutting	Field
Four leaf Clover	*Marsilea quadrifolia* Linn.	Marsileaceae	Herb/ Creeper	Seed/Stem cutting	Field
Gandh prasarni	*Paederia foetida* Linn.	Rubiaceae	Herb/ climber	Stem cutting	Field
Giloye	*Tinospora cordifolia* (Willd.) Miers.	Menispermaceae	Herb/ Climber	Stem cutting	Field
Gudmar	*Gymnema sylvestre* (Retz) R. Br.	Asclepiadaceae	Herb/ Climber	Stem cutting	Poly bags
Gunj	*Abrus precatorius* Linn.	Fabaceae	Herb/ Climber	Seed	Poly bags
Hathzode	*Cissus quadrangualaris* Linn.	Vitaceae	Herb/ Climber	Stem cutting	Field
Kala bel,	*Cryptolepis dubia* (Burm.f.) M.R.Almeida	Apocynaceae	Shrub/ Climber	Seed/ Stem cutting	Poly bags
Kali mirch, Black Peeper	*Piper nigrum* Linn.	Piperaceae	Herb/ Climber	Stem cutting	Poly bags
Karela	*Momordica charantia* Descourt.	Cucurbitaceae	Herb/ Climber	Seed	Field
Kaurav – Pandav, Passion flower	*Passiflora foetida* Linn.	Passifloraceae	Herb/ Climber	Stem cutting	Poly bags
Kewanch	*Mucuna pruriens* (L.) DC.	Fabaceae	Herb/ Climber	Seed	Poly bags

Table 1 Cntd…

Table 1. Cntd.

Common name	Botanical name	Family	Habit	Propagation	Mode of multiplication
Lablab	*Dolichos lablab* Linn.	Fabaceae	Herb/ Climber	Seed	Field
Little gourd,	*Coccinia grandis* (L.) *Voigt.*	Cucurbitaceae	Herb/ Climber	Seed	Poly bags
Mandukparni	*Centella asiatica* (L.) Urban.	Apiaceae	Herb/ Creeper	Stem cutting	Poly bags
Pan	*Piper betel* Linn.	Piperaceae	Herb/ Climber	Stem cutting	Field
Pipli	*Piper longam* Linn.	Piperaceae	Herb/ Creeper	Stem cutting	Poly bags
Poi, Malabar night-shade	*Basella alba* Linn.	Basellaceae	Herb/ Climber	Seed/ Stem cutting	Poly bags
Pothos	*Epipremnum aureum* (L.) Engl.	Araceae	Herb/ Climber	Stem cutting	Poly bags
Rangoon ki bel	*Quisqualis indica* Linn.	Combretaceae	Shrub/ Climber	Stem cutting	Poly bags
Sagovani, Gadaria Ki bel,	*Pergularia daemia* (Forssk) Chiov.	Apocynaceae	Herb/ Climber	Seed cutting	Field
Spiny gourd, Kheksi	*Momordica dioica* Roxb. ex Willd.	Cucurbitaceae	Herb/ Climber	Seed	Field
Sweet Potato	*Ipomoea batatas* Linn.	Convolvulaceae	Herb/ Creeper	Tuber/ Stem cutting	Field
Trumpet climber	*Campsis radicans* (L.) Seem. ex Bureau.	Bignoniaceae	Shrub/ Climber	Stem cutting	Field
Velvet Leaf, Barbasco.	*Cissampelos pareira* L.	Menispermaceae	Herb/ Climber	Seed	Field
Vidhara, Elephant creeper, Woolly morning glory.	*Argyreia nervosa* (Burm.f.) Bojer	Combretaceae	Herb/ Climber	Seed/ Stem cutting	Field
Water Morning Glory	*Ipomoea aquatica* Forssk.	Convolvulaceae	Herb/ Creeper	Stem cutting	Poly bags

Table 3 and Fig. 2 show the habit diversity of the climber/creeper MAPs. A maximum of 26 herbs were introduced which were climbing/creeping in nature, whereas 6 herb/climbers, 4 shrub/climbers and a shrub/creeper were collected and conserved in the Herbal Garden during the period of the study. Previous studies on diversity of climbers in different parts of India suggest that the climbers are the main components of ecosystem, and their conservation is important to establish their appropriate utilization (Mahajan, 2006; Ajaib et al., 2012; Singh et al., 2013). The present study results also show that the conservation of important MAPs of climber/creeper category in the study area is possible *ex-situ*. Further investigation on long term conservation and propagation modes is in progress.

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Table 2. Family wise distribution of climber and creeper Medicinal and Aromatic Plants (MAPs).

Family	Herb/ Climber	Herb/ Creeper	Shrub/ Climber	Total
Apiaceae	-	1	-	1
Apocynaceae	2	-	-	2
Araceae	1	-	-	1
Asclepiadaceae	2	-	-	2
Basellaceae	2	-	-	2
Bignoniaceae	1	-	1	2
Combretaceae	-	-	2	2
Convolvulaceae	1	4	-	5
Cucurbitaceae	4	-	-	4
Dioscoriaceae	2	-	-	2
Fabaceae	4	-	-	4
Marsileaceae	-	1	-	1
Menispermaceae	2	-	-	2
Passifloraceae	1	-	-	1
Piperaceae	2	1	-	3
Rubiaceae	1	-	-	1
Vitaceae	1	-	1	2
			TOTAL	**37**

Fig. 1: Regeneration methods of climber and creeper Medicinal and Aromatic Plants (MAPs).

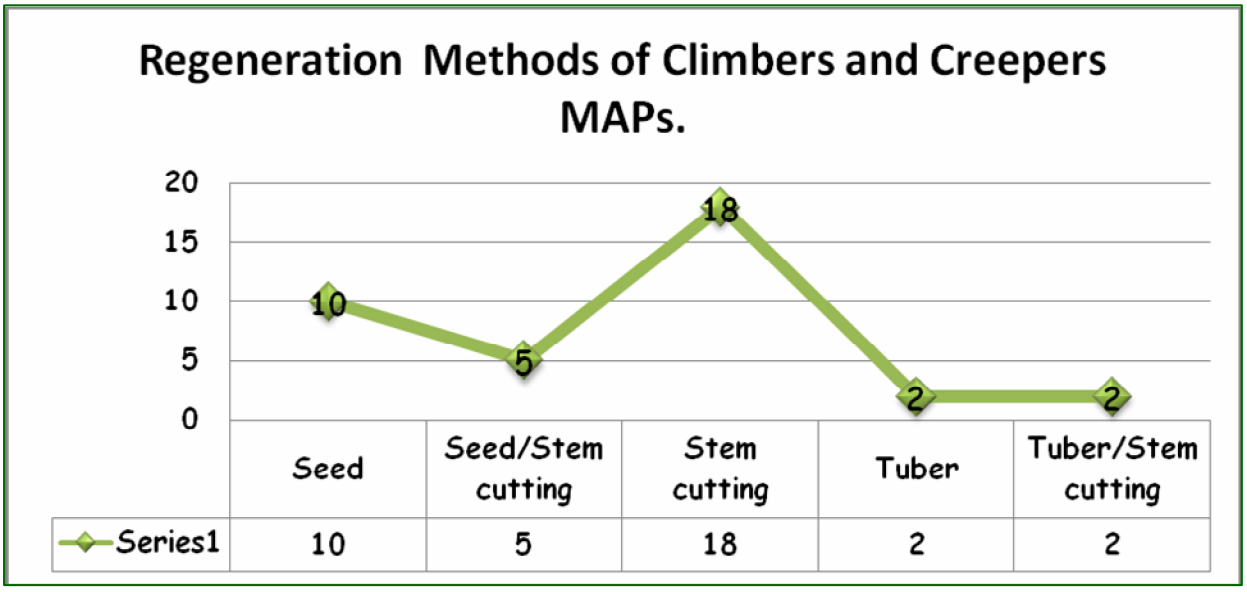
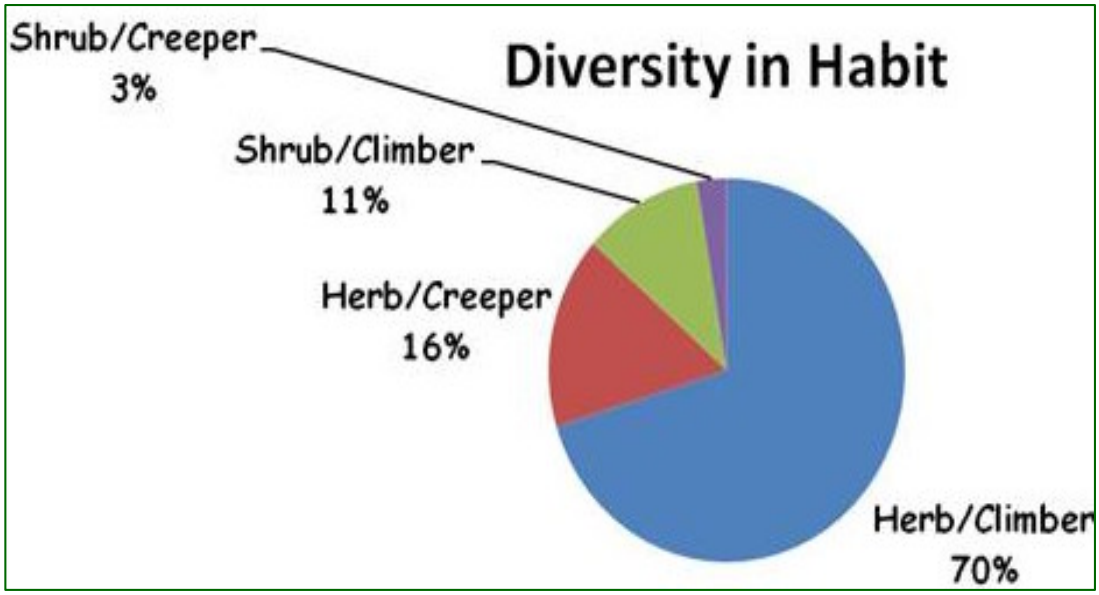


Table 3. Diversity in habit of the climber and creeper Medicinal and Aromatic Plants (MAPs).

Habit Type	Number of the Aromatic Plants
Herb/Climber	26
Herb/Creeper	06
Shrub/Climber	04
Shrub/Creeper	01
Total	**37**

Fig. 2: Percentage (%) diversity in habit of the climber and creeper Medicinal and Aromatic Plants (MAPs).



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