ISSN: 2457-0761

JBC-APRF-1(2): 34-34, 2018

JOURNAL OF BIODIVERSITY AND CONSERVATION

Phenology and key characters for the restoration of *Hypericum gaitii* Haines: a threatened plant species of Similipal Biosphere Reserve, Odisha, India

Padma Mahanti[1], Sunil S. Thorat[2], Sanjeet Kumar[3]

[1]Directorate of Environment and Climate Change, Kerala, India- 695562

[2]Institute of Bioresources and Sustainable Development, Imphal, Manipur, India

[3]Ambika Prasad Research Foundation, Odisha, India

[4]Shree Gopaljew Trust, Bhubaneswar, India

[5]Odisha Wildlife Hub, Bhubaneswar, India

[6]Taxonomy and Conservation Division, Regional Plant Resource Centre, Bhubaneswar, India

*president@aprf.org.in

ARTICLE INFO

Article History
Received: 15 September 2017
Received in revised form: 7 October 2017
Accepted: 22 Ocrober 2017

Keywords: *Hypericum gaitii*, *In situ* conservation, Phenology, Threatened, Vegetative propagation, Tiger population

Abstract

Phenological study might be helpful to identify the key vegetative characters for the vegetative reproduction of rare, endangered and threatened plant species which will be benevolent to the *in situ* conservation inside the core area of Biosphere Reserves or Tiger Reserves. In the current study conducted at Similipal Biosphere Reserve & Similipal Tiger Reserve, India, *Hypericum gaitii* Haines, a threatened plant species of the locality; discovered by HH Haines in 1918 is selected from its native habitat. *In situ* and *ex situ* phenological studies were carried out and habitats characters were noted. Seedlings were propagated through the growth hormones. The analysis showed that maximum number of secondary branches showed high possibility of vegetative propagation (through stem cutting) of the plant. The seedlings were easily propagated through stem cutting methods of secondary branches using growth hormones. It was concluded that the phenological studies will be helpful for the *in-situ* conservation of threatened plant species particularly inside the

core area of protected forest for Tigers or Biosphere Reserves.

Introduction

Floral wealth represents the conditions of a geographical area. They are treasures of the needs for the biological life. India is well known for its rich diverse floral wealth throughout the world. Literature reveals that about 45,500 plant species are found in the country which is about 11% of the world's floral diversity. It ranks among the top ten species rich nations of the world (Sharma & Singh 2000; Chitle et al., 2014). India enjoys the diverse landscapes, vegetation, climate and ecological conditions. These topographic and climatic conditions provide an untamed floral wealth. About 17,527 angiosperms, 12,00 species of pteridophytes and 67 species of gymnosperms are reported in the literature (Singh and Chaturvedi, 2017). Among them, about 2,500 plant species are reported in Eastern Ghats of the country (Kannadhasan et al., 2016; Panigrahy et al., 2016). Odisha is a major part of the Eastern Ghats and rich floral wealth region of the country having 8 endemic, 75 apparent endemic and more than 100 plant species that comes under threatened categories (Natrajan et al., 2004; Natrajan and Srinivasan 2013). Therefore there is a need for the restoration of plant species of Odisha under threatened group. Similipal Biosphere Reserve (SBR) is the main part of the Eastern Ghats and also a home of numbers of threatened plant species (Rout, 2008). Keeping this in view an attempt was made to find out the key character for the vegetative propagation through the phenological study of the rare, endangered and threatened plant species. Among the threatened species of SBR, *Hypericum gaitii* (HG) is a shrub belonging to family Hypericaceae having beautiful yellow flower. It is mostly found near the mountain rivers or streams. It acts as an indicator for the tropical moist deciduous forest of Similipal Biosphere Reserve (SBR), India. It is locally know as "Ban Kaly" and have sound medicinal properties against skin eruption (Pattanaik et al., 2009). The population of the plant is declining in alarming rate even though it comes under threatened categories. First time, H. H. Haines collected it from the Neterhat (Combined state of Bihar & Orissa) in the year 1918 (Haines, 1920).

Methodology

Plant species were identified following the Flora Book (Brahmam and Saxsena 1994). Second author found *H. gaitii* near the stream of Jenabil area of SBR in the year 2009 and again in 2017 during the survey of wildlife, medicinal plants and threatened species. Authors found it at UBK (Upper Barha Kamuda) in SBR dt. 09th January 2017 as a small patch near stream. The plants were found to be healthy and keeping this in view an attempt has been made to study its phenology (Arroyo et al. 1981; Finner 1998) and compared with the planted *H. gaitii* at RET Garden, Ekamra Kanan, Bhubaneswar. The seedlings were developed at Regional Plant Resource Centre using local growth hormones

by stem cutting methods (Takoutsing et al., 2014).

Results

1.1. Botany of *H. gaitii*

It is a shrub having much terete branches; leaves are oblanceolate and elliptic-obling, glabrous, pale beneath, actute to sub-acute; Flower is yellow about 7 cm diameter; 1.2-1.3 cm filament; 1.8-1.9 cm style; 2.5-2.8 cm petal and 0.8-0.9 cm sepal. Sepals ovate, petals obovate; 5 bundled stamens. Capsule conical. Seeds are brown and oblong.

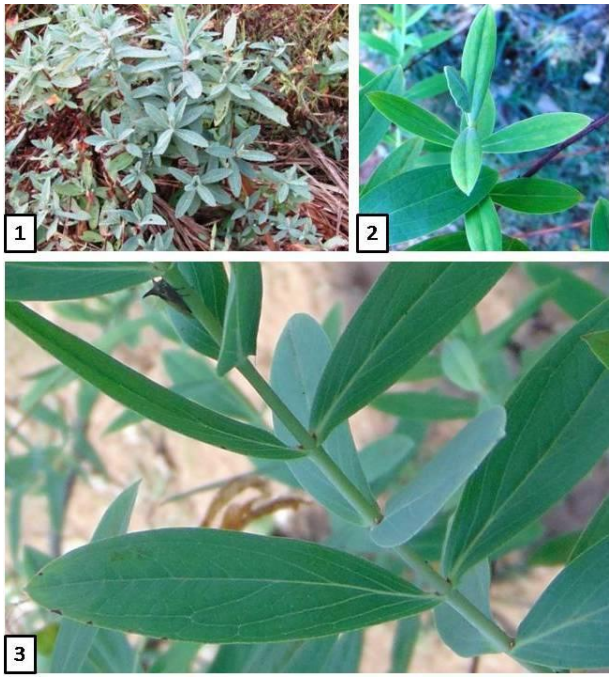

Figure 1: Vegetative parts of *H. gaitii* Haines, 1: *H. gaitii* at natural habitat in Similipal Biosphere Reserve, 2: Apical part, 3: Leaves arrangement

(Ekamra Kanan, Bhubaneswar during work on RET species)

Figure 2: Floral parts of *Hypericum gaitii* Haines

Figure 3: Floral parts and pollination

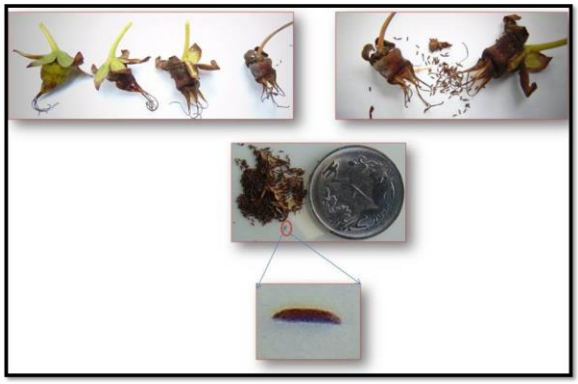

Figure 4: The matured pods and seeds of *Hypericum gaitii*

Analysis

Results revealed that the average height of the plant inside the core area of SBR is 155 cm having 3.8 primary branches (average) and 12 secondary branches (average) along with about 24 leaves present in apical twig (Table 1). The results is almost same with the characterization of the plants of threatened garden, Ekamra Kanan, Bhubaneswar, India (Table 2). The seedlings were easily propagated through the stem cutting of the plant species, and maximum number of secondary branches showed high possibility of vegetative propagation (through stem cutting) of the plant which will be helpful for *in-situ* conservation.

Table 1: The phenology of randomly selected plants of *Hypericum gaitii* Haines

Parameters	Values
Height	155. 11[a]
Primary branches / plant	3.8
Secondary branches / plant	12.33
Leaf	5.22[b]
	1.5[c]
Number of leaves / twig	24.33[d]

(a: size in cm, n=30; b: length in cm, n=30; c: breadth in cm; d: leaves present in apical twig having flower, n=30)

Table 2: The phenology of randomly selected plants at threatened Garden, Ekamra Kanan, Bhubaneswar, India

Parameters	Values
Number of flowers / plant	48.93[a]
Height	158.33
Primary branches / plant	3.6
Secondary branches / plant	12.66
Petals	2.86[b]
Sepal	0.88[b]
Flower diameter	7.34
Filament	1.26
Style	1.84
Leaf	5.21[c]
	1.6[d]
Number of leaves / twig	23.93[e]
Number of buds / bunch	3[f]

(a: n=30; b: size in cm, n=30; c: length in cm, n=30; d: breadth in cm; e: leaves present in apical twig having flower, n=50; f: buds present in a group, n=50)

Figure 5: Vegetative propagation and seedlings of the *Hypericum gaitii*

Suggestions

The *in-situ* conservation is possible by having experimental plots inside the core area SBR or Biosphere Reserve or Tiger Reserves and reintroduction can be done in suitable habitat. Reintroduction of this threatened species will help in maintenance of the ecological balance of UBK, Jenabil, and Nawana area of SBR. The absence of *H. gaitii* may encourage the spread of invasive grasses which will in turn compete

with the food plant species of prey of Tigers. Hence, for conservation of the mega fauna, the entire ecological balance needs to be restored in the Tiger dominant areas of SBR. Since HG is found in the present Tiger ranges of STR, its *in-situ* conservation is of utmost importance.

Acknowledgement

Authors are thankful to Chief Executive, Regional Plant Resource Centre (RPRC), Bhubaneswar; Dr. P.C. Panda, Principal Scientist, RPRC, Bhubaneswar; Field Director, Similipal Biosphere Reserve, Odisha

References

Arroyo, M. T. K., Armestoj, J. and Villagran, C. (1981). Plant phenological pattern in the high Andean cordillera of Central Chile. J. Ecol., 69, 206-223.

Chitale, V. S., Behera, M. D. and Roy, P. S. (2014). Future of endemic flora of biodiversity hotspot in India. PLOS One, 1, 1-15.

Finner, M. (1998). The phenology of growth and reproduction in plants. Perspective in Plant Ecology, Evolution and Systematics. 1(1), 78-91.

Haines, H. H. (1920). *Hypericum Gaitii*. Journal and Proceedings of the Asiatic Society of Bengal, 15, 311-311.

Kannadhasan, M., Kadirvelmurugan, V., Karthik, V., Amarasuriyan, C. and Raju, K. (2016). Traditional knowledge on ethnomedicinal plants used by the Malayali tribe of Pachaimalai Hills, Eastern Ghats of Tamil Nadu, India. Der Pharmacia Lett., 8(12), 117-126.

Natarajan, D. and Srinivasan, R. (2013). Distribution mapping of rare, endangered and threatened (RET) plants in the Chittei Hills, Eastern Ghats, South India. In: Ramkumar M. On a sustainable future of the Earth's Natural Resources. Springer Earth System Sciences. Springer, Berlin, Heidelberg.

Natrajan, D., John, B. S., Balaguru, B., Nagamurugan, N., Soosairaj, S. and Arockiasamy, D. I. (2004). Identification of conservation priority sites using remote sensing and GIS-a case study from Chitteri Hills, Eastern Ghats, Tamil Nadu. Curr. Sci., 86, 1316-1323.

Panigrahy, J., Behera, S. K., Venugopal, A. and Leelaveni, A. (2016). Ethnomedicinal study of some medicinal plants from Kandhamal district, Odisha. Int. J.Herbal Med., 4(5), 36040.

Pattanaik, C., Reddy, C. S. and Reddy, K. N. (2009). Ethno-medicinal survey of threatened plants in Eastern Ghats, India. Our Nature. 7, 122-128.

Rout, S. D. (2008). Anthropogenic threats and biodiversity conservation in Similipal Biosphere Reserve, Orissa, India. Tigerpaper. 35(3): 22-26.

Saxena, H. O. and Brahmam, M. (1994). Flora of Orissa. Regional Research Laboratory and Orissa Forest Development Corporation Ltd. Bhubaneswar. 1. P. 111-111.

Sharma, J. R. and Singh, D. K. (2000). Status of plant diversity in India: an overview. In: Roy, P. S., Singh, S. and Toxopeus, A. G. Biodiversity & Environment. Remote Sensing and Geographic Information System Perspectives. Indian Institute of Remote Sensing, national Remote Sensing Agency, Dehra Dun.

Singh, J. S. and Chaturvedi, R. K. (2017). Diversity of Ecosystem types in India: a review. Proceeding of Indian National Science Academy. DOI: 10.16943/ptinsa/2017/49027.

Takoutsing, B., Tsobeng, A., Zacharie, T., Degrande, A. and Asaah, E. (2014). Vegetative propagation of *Garcinia lucida* Vesque (Clusiaceae) using leafy stem cuttings and grafting. Africa Focus, 27, 75-71.