Journal of Pharmacognosy and Phytochemistry
Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2018; SP3: 201-203

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National conference on "Conservation, Cultivation and Utilization of medicinal and Aromatic plants"
(College of Horticulture, Mudigere Karnataka, 2018)

Rare and endemic medicinal plant, *Parsonsia alboflavescens* (Dennst.) Mabb. and malabar tree nymph butterfly, *Idea malabarica* in Western Ghats of Karnataka

Aishwarya B and Revanna Revannavar

Abstract
Spiral-vined silkpod, *Parsonsia alboflavescens* (Dennst.) Mabb. is an important rare and endemic medicinal plant belongs to Apocynaceae which is used to treat haemorrhage of nostrils, boils, insanity, leg swellings, disinfectant, tuberculosis, vulnerary febrifuge, rheumatism, kidney problems and enhances immunity in AIDS patients. This woody climber located in undisturbed swampy forest of Hebbale village, adjacent to Bhadra river band near Kalasa town, Mudigere taluk, Chikkamagaluru district, Karnataka State, India. The habitat is at latitude (DMS) 13^{O}13´54N, longitude (DMS) 75^{O}21´26N, altitude 789m in Western Ghats of India. The investigation was carried out during 2017-18. In this habitat, water slowly drain out from the moist hilly soil, stagnate and flow slowly in shallow manner and shade is more than 50 per cent. *P. alboflavescens* habitat was undisturbed, cool, moist, diversified with flora and fauna. The annual average temperature of the habitat was 25.92^{o}C and received 838mm rain during 2017-18. There were only 58 *P. alboflavescens* plants in the habitat. The older *P. alboflavescens* climb over the trunk, canopy of tall forest trees and flowers, green pods were observed in April 2018. The stems were gray, leaves were ovate (5-13x4-8.0cm), 5-7 lateral veins and petiole length was 2.0-3.0 cm. The smaller *P. alboflavescens* plants can be easily uprooted and replanted successfully. The height of *P. alboflavescens* was relatively 0.5ft to more than 20.0 m. *Idea malabarica* butterfly feed on nectar, leaves of *P. alboflavescens* and the activity was throughout the year. Adult butterflies glide slowly over canopy of forest trees and the activity was limited only within the above described habitat. The medicinal plant *P. alboflavescens* is at risk and *I. malabarica* is also at lower risk or near threatened as per the publication of IUCN.

Keywords: *Parsonsia alboflavescens, Idea malabarica,* Western Ghats of Karnataka

Introduction
Spiral-vined silkpod, *Parsonsia alboflavescens* (Dennst.) Mabb. is a woody climber or twiner belongs to Apocynaceae and reported rarely from endemic swampy forests of China, Japan, Indian subcontinent, Indo-China, Malaysia and Philippines. *P. alboflavescens* is categorised as R (at risk) in 1997 IUCN red list of threatened plants. The taxa classified under risk are localised within restricted geographical areas or habitats or thinly scattered over a more extensive range (Walter and Gillett, 1998) [11].

The plant is a source of uncommon macrocyclic Pyrrolizidine Alkaloids (PAs) which are important in curing haemorrhage of nostrils and boils (Manilal and Ramesh, 2010) [7]. Leaves are used for treating insanity, leg swellings, disinfectant, tuberculosis, vulnerary febrifuge, rheumatism and kidney problems (Nirmala Devi *et al.*, 2017) [8]. The composition containing *Parsonsia* extract is also used for treating AIDS and associated conditions (Asiedu *et. al.*, 2004) [11].

The alkaloids of *P. alboflavescens* also stimulate oviposition of danaid butterflies (Honda *et al.*, 1997) [5]. Larvae of danaid butterfly sequester pyrrolizidine alkaloids from *P. alboflavescens* leaves which can be found with metabolite of adult butterflies as defensive and semiochemicals (John *et al.*, 1980) [6].

P. alboflavescens is larval and major nectar host plant of malabar tree nymph butterfly, *Idea malabarica* Moore 1877 (Lepidoptera: Nymphalidae) which is at lower risk or near threatened

as per the publication of IUCN-UK 1996.
Therefore, it is important to study the habitat of rare medicinal plant, *P. alboflavescens* and associated nearly threatened-butterfly, *I. malabarica* for conservation point of view.

Materials and methods

The observations on spiral-vined silkpod, *Parsonsia alboflavescens* were made in the swampy forest which is adjacent to robusta coffee plantation of Mr. H. S. Shrikanth. The habitat is near Bhadra River Bridge along Bhadra river band of Hebbale village of Kalasa town, Mudigere taluk, Chikkamagauluru district, Karnataka State.
The habitat of the plant was visited several times and observations were made at approximately monthly interval for one year during 2017-18. The habitat of *P. alboflavescens* was described by recording number of *P. alboflavescens* climbers, relative age structure, twining and spreading behaviour, relative spatial distribution, geographical position of the habitat, temperature, rainfall and relative shade prevailed in the habitat and the activity of Malabar tree nymph, *Idea malabarica* butterfly.

Results and Discussion

Habitat of *P. alboflavescens*

The habitat of *P. alboflavescens* is located in undisturbed swampy forest of Western Ghats of India which is adjacent to Bhadra river band, near Hebbale village, Kalasa Town, Mudigere taluk, Chikkamagaluru district, Karnataka state. The location was at latitude (DMS) 13^{O}13´54N, longitutue (DMS) 75^{O}21´26N, altitude 789m. In this habitat, water slowly drain out from the moist hilly soil, stagnate and flow slowly in shallow manner and the shade is more than 50 per cent.
P. alboflavescens plants can survive in stagnant water, however the growth and abundance of plants was more bountiful, clustered on moist soil adjacent to shallow stream. The older *P. alboflavescens* plants twine, climb over the trunk, branches of huge tall trees like hebbalasu, *Artocarpus hirsutus* and spread over the canopy of trees. The flowering and green pod formation was observed in April 2018. The mature main stems were gray, leaves were ovate (5-13x4-8.0cm), 5-7 pairs of lateral veins and petiole length were 2.0-3.0 cm. *P. alboflavescens* plants were distributed in limited area of the swampy forest, not all along the stream. The smaller *P. alboflavescens* plants can be easily uprooted without damage to the roots and successfully can be established in new location.
The age of *P. alboflavescens* plants was categorised relatively into 0.5ft-2.0m, 2.0-5.0m and more than 20.0 m hight, there were 42, 11 and 05 plants, respectively in the swampy forest habitat (Table 1). Thus there were only 58 *P. alboflavescens* plants in the above described habitat.

Table 1: Age structure of *P. alboflavescens* in the swampy forest habitat

Sl. No.	Age categories (ht.)	Abundance (No.)
1	0.5-2.0m	42
2	2.0-5.0m	11
3	>20.0m	05
Total		58

The environment of *P. alboflavescens* habitat was undisturbed, cool, shaded, moist, diversified with flora and fauna. The annual average temperature of the habitat was 25.92 ºC, humid and received 838 mm rainfall during 2017-18.

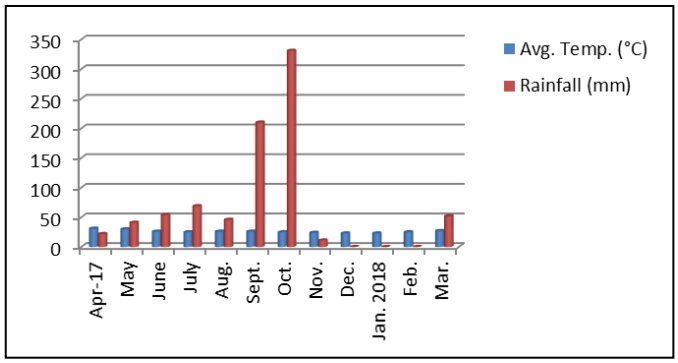

Fig. 1: Temperature and rainfall prevailed in the habitat of *P. alboflavescens*

Malabar tree nymph butterfly, *Idea malabarica* Moore

Idea malabarica butterfly lays eggs on under surface of the leaves, caterpillar feeds on leaves, pupate on under surface of leaves and adult butterflies feed on nectar of *P. alboflavescens.* Adult butterflies most of the time hover on canopy huge tall trees where *P. alboflavescens* was spread profusely. The adult butter flies activity was found throughout the year, butterflies glide very slowly over forest canopy in relaxed manner, whereas adult butterfly activity was rare at ground level. The adult butterfly flight activity was restricted to the above described habitat, rarely found outside its territory.
The woody climber *P. alboflavescens* is categorised as R (at risk) in 1997 IUCN red list of threatened plants (Walter and Gillett, 1998) [11]. It is also rare and endemic to swampy forests of Western Ghats of Karnataka state, India. However, the observed characteristics of the plant were similar to the description made by Tong xin jie shu (1995) [10].
The unusual macrocyclic pyrrolizidine alkaloids (PAs) were detected in archived samples up to 13 years old the nectar, leaves, sap and seeds of *P. alboflavescens* which demonstrate the longevity and persistence of PAs and defend against herbivores (Burzynski *et al.*, 2015) [2]. Several reports have confirmed the therapeutic properties of these alkaloids for curing haemorrhage of nostrils, boils insanity, leg swellings, disinfectant, tuberculosis, vulnerary febrifuge, rheumatism and kidney problems as well as treating AIDS and associated conditions.
PAs play an important role in the chemical defence mechanism of plants against certain insect herbivores (Hartmann, 1999) [3]. However, caterpillars of *Idea malabarica* feed on leaves and pupate (Susanth, 2005) [9] and adult butterflies feed on nectar and pollinate *P. alboflavescens* (Hartsock, 2012) [4]. The alkaloids of *P. alboflavescens* also stimulate oviposition of danaid butterflies (Honda *et al.*, 1997) [5].

Plate 1. *Parsonsia alboflavescens*

Plate 2. *P. alboflavescens* habitat

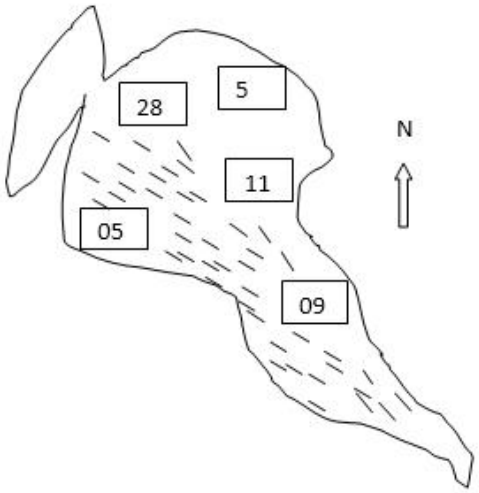

Fig. 2. *P. alboflavescens* habitat

Plate 3. Adult Butterfly, *Idea malabarica*

Conclusion

The unusual macrocyclic pyrrolizidine alkaloids (PAs) present in *P. alboflavescens* are known for curing many kinds of human diseases and defence against herbivore. The IUCN has categorised the medicinal plant *P. alboflavescens* as at risk, *I. malabarica* as at lower risk or near threatened and these species are endemic to Western Ghats of Karnataka. Hence, the knowledge gained from this research may help in conservation and implementing species recovery programmes.

Acknowledgement

Special thanks to Shrikanth, H. S., Mohini, B. and Manjunath, B. for their encouragement, inspiration and help during the investigation.

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