


## Preliminary Observation on The Ecological Amplitude of *Hypoestes phyllostachya* Baker in Darjeeling and Kalimpong Himalayas

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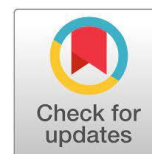
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### Abstract

*Hypoestes phyllostachya* Baker (“Polka dot Plant”) is an exotic species that is quite problematic weed of Madagascar origin in Darjeeling and Kalimpong regions of Eastern Himalayan Vegetation. Present study was carried out in 26 different localities covering a vertical distribution from an altitude of 90 msl (Teesta Bazar) to 2,478 msl (Senchal Lake) and horizontal distribution from Rimbik (27.1182° N, 88.1084° E) to Bindu (27.0977° N, 88.8713° E), which revealed its very high invasive potential and ecological amplitude. Its presence in agricultural land together with forest and open land has been a matter of concern as it is creating a threat to the local floras. It was strongly felt that its control measure has to be implemented immediately in order to restore the ecological balance in these local areas.



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### Introduction

*Hypoestes phyllostachya* Baker commonly known as “Polka dot plant” belongs to Acanthaceae family is a plant of Madagascar origin. It is thought to be a foreign element and has very high invasive nature (Annon, 2016a, Moktan, 2017). Therefore, it is considered as one of the most problematic weeds (Annon, 2016b), particularly in Eastern Sub-Himalayan region. The increasing population of such exotic species in local region has been a great threat to the local floristic environment which may cause enormous loss of genetic diversity and ultimately species extinction.

While working on the plant resources of Mahananda Wildlife Sanctuary located in the Darjeeling district of West Bengal, Kumar et al. (2009) added new record of *H. phyllostachya* from West Bengal. Similarly, this species was also reported from the State of Kerala as an addition to the Flora of India (Remadevi and Binojkumar, 2001). This species was originally described from

Madagascar and is also distributed in North America (Kumar et al., 2009). However, its frequent presence in many places of Darjeeling and Kalimpong districts of West Bengal prompted us to conduct the survey to find out the ecological amplitude as well as its distribution pattern in these two districts of West Bengal.

### Materials and Methods

Regular surveys were conducted covering different seasons and various regions (table 1) of Darjeeling and Kalimpong hills. Relevant samples were collected, and herbarium sheets were prepared (Paul et al, 2020). Collected samples were identified using available literatures and also by comparing the herbarium sheets at the Herbarium of Department of Botany, Kalimpong College. Local farmers and tea garden workers were also asked regarding the invasion problems and other related issues of *Hypoestes phyllostachya* in their localities.

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**Table. 1** Places where surveys were carried out.

Sl. No.	District	Localities	Altitude (M)	Latitude/Longitude	Date of collection
1	Darjeeling	Sungma T.E.	1710	26.938088° N & 88.178831° E	26/10/2019
2		Bunkulung	622	26.7957° N & 88.3118° E	11/10/2020
3		Nagri T.E.	1215	26.9121° N & 88.2096° E	11/10/2020
4		Dhajea T.E.	1050	26.9240° N & 88.2193° E	11/10/2020
5		Mirik (near lake)	1495	26.8908° N & 88.1825° E	08/08/2021
6		Sukhia Pokhri	2194	26.9984° N & 88.1669° E	30/10/2019
7		Rangbhang (near bridge)	1160	26.9002° N & 88.1975° E	08/08/2021
8		Ghoom (near railway station)	2558	27.0008° N & 88.2437° E	30/10/2019
9		Maneybhanjyang bazar	1928	26.9879° N & 88.1209° E	30/10/2019
10		Rimbik bazaar	2286	27.1182° N & 88.1084° E	10/11/2021
11		Deer Park Kurseong	1482	26°53'10.3"N & 88°17'27.5"E	22/10/2019
12		Sonada	1873	26.9599° N & 88.2680° E	22/10/2019
13		Lebong	1809	27.0615° N & 88.2765° E	22/11/2021
14		Tiger Hill (near Senchal Lake)	2487	26.9932° N & 88.2657° E	22/11/2021
15		Lapchu bazaar	1500	27.0600° N & 88.3654° E	25/08/2021
16		Teesta bazaar	90	27.0662° N & 88.4246° E	25/08/2021
17		Darjeeling bazar (Mal Road)	2080	27.0428° N & 88.2652° E	22/11/2021
18	Kalimpong	Kalimpong College Campus	1259	27.0595° N & 88.4669° E	10/03/2018
19		Lava	2345	27.0863° N & 88.6615° E	10/08/2018
20		Loleygoan	1670	27.02071°N & 88.565018°E.	10/08/2018
21		Gorubathan	417	26.9542° N & 88.6952° E	18/14/2018
22		Div Chowk	1275	27°02'33.6"N & 88°27'38.9"E	10/03/2019
23		Dr. Gram's Homes campus		27.0836° N & 88.4922° E	10/10/2021
24		Seed Farm, RRS, UBKV Campus	990	27.0717° N & 88.4799° E	12/10/2021
25		4 <sup>th</sup> Mile	1100	27°4'0.0048" N & 88° 28' 0.0012" E	12/10/2021
26		Bindu (Jaldhaka)	609	27.0977° N & 88.8713° E	26/09/2020

## Results and Discussion

*Hypoestes phyllostachya* is a 30 cm (12 in) tall, evergreen herb with heavily pink or white spotted leaves. It produces small, many solitary pink/purple flowers and fruits are many-seeded dehiscent capsule. The species are found with high seed germination rate and mostly growing on margins of forests, agricultural and wild areas. Total 26 locations were surveyed covering the altitudinal range from 90 msl (Teesta Bazar) to 2,487 msl (Senchal Lake, Senchal Wild Life Sanctuary) and 27.0977° N, 88.8713° E (Bindu, Jaldhaka) to

27.1182° N, 88.1084° E (Rimbik, Darjeeling) latitude-longitude gradients. In almost all the regions, *Hypoestes phyllostachya* were found growing luxuriantly. Its presence was abundant in the open spaces, mainly east and south east facing hill slopes. Forest floor and forest margins were also frequently covered by this species. Its presence was also noted in tea garden areas in some places (e.g., Sungma T.E., Nagri T.E., Dhajea T.E., etc). In those areas, it was not only seen in the open areas, but was also frequently present in between tea bushes.

Some farmers from the surveyed areas were of opinion that the polka dot plant has been a

problematic weed in agricultural field since recent past, as it has been invading new places in a very fast rate. Although the fields growing annual crops like maize, ginger, cauliflower, and other seasonal vegetables have been found to be less invaded by this weed, however, perennial crops like large cardamom growing field and mandarin orange orchard have been affected significantly. The reason may be that the manual weeding is done at regular interval in the annual crop fields, while in cardamom fields such activity is done once in a year before the harvest and only once or twice such manual weeding is done in mandarin orchards.

According to the tea garden labours, the growth of *Hypoestes phyllostachya* is very difficult to control. Before 2005, some tea gardens practised the usage of inorganic herbicide and weedicide to control the over growth of tea garden weeds. However, the chemicals were found to be least effective to control this species. Comparatively, the manual weeding (uprooting) was found to be effective in controlling the weed's growth.

In this present study, the distribution pattern of *H. phyllostachya* was found to be quite interesting, as its ecological amplitude has been found to be wide. The vertical distribution varying from an altitude of 90 msl (Teesta Bazar) to 2487 msl (Senchal Lake) and its horizontal distribution from 27.0977° N, 88.8713° E (Bindu, Jaldhaka) to 27.1182° N, 88.1084° E (Rimbik, Darjeeling). In earlier study (Kumar et al., 2009), its presence was also noted at lower edge of Mahananda Wild Life Sanctuary. In all the surveyed areas, the population of this species has been found to be abundant. Thus, an immediate step has to be taken to control its invasive potentials. It has been invading to new places steadily and

rampantly, thereby imposing a serious threat to the local flora as well.

### Conclusion

Although, *Hypoestes phyllostachya* is an exotic element, it is believed to have escaped from some ornamental gardens and naturalized in some parts of India. By observing the rate of invasion of *Hypoestes phyllostachya* in Darjeeling and Kalimpong regions of Eastern Himalayas, its threat to the local flora is very clear. Moreover, the present study revealed that its vertical as well as horizontal distribution is quite extensive. Therefore, implementation of its control measure(s) is an immediate need of the hour.

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