

ETHNOMEDICINAL VALUE OF EPIPHYTIC ORCHIDS IN FOOT HILLS OF HIMALAYA IN TEA GARDEN AREA OF TERAI, WEST BENGAL, INDIA

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Abstract

Orchidaceae is one of the families of plant kingdom that requires substantial conservation. Several epiphytic orchids have been found in tea gardens of foot-hills of Himalayan region in West Bengal, India. During the present field study in randomly selected 14 tea gardens of Terai region of West Bengal (New Chamta, Sannayasithan, Singhia Jhora, Kiran Chandra, Naxalbari, Vijoy Nagar, Atal, Hansqua, Gangaram, Dagapur, Sukna, Kamalpur, Gulma, and Mohorgaon), 12 species in 9 genera were recorded. *Oraon* and *Kharia* tribal communities are very popular in this region and utilize all these epiphytic orchids as medicine. Different plant parts such as root (6 species), leaf (7 species), pseudobulb/or stem (2 species), flower (3 species), and whole plant (2 species) are used for medicinal purpose. Fidelity level which expressed relative healing potential of medicinal plants was also calculated. Cent per cent fidelity value has been recorded in *Bulbophyllum crassipes*. According to IUCN Red List of threatened species (Version 2019-3), *Dendrobium aphyllum* is Least Concern (LC) species. Most of the epiphytic orchid species are facing threats in the tea garden region of Terai due to deforestation of old shade trees and lopping. Host-less epiphytic orchids should be transplanted on proper phorophytes (shade tree) in the tea garden. There is an urgent need to create awareness amongst people of the region about these orchids growing in tea garden of Terai region of West Bengal, India so as to preserve biodiversity and maintain a balance in the ecosystem.

Introduction

ORCHIDS ARE popular for their floral diversity and medicinal value. These grow in diversified habitat such as epiphytic, terrestrial, lithophytic, and some of them are saprophytes. About 69% of orchids are epiphytic (Yonzon, 2012); these epiphytic orchids are perennial herbs. Several epiphytic orchids have been found in tea gardens of foot-hills of Himalayan region in West Bengal, India. There are different types of tribal communities found in this region. Amongst them, *Oraon* and *Kharia* communities are very popular; they speak *Sadri* as their native language. They come from undivided Bihar state (mainly from *Chhotanag pure* region) to work in tea gardens (West Bengal, India) as labourers. *Oraon* and *Kharia* tribal communities totally depend on herbal medicine. They use different epiphytic orchid species to treat different diseases. Infact, this type of practice has been developed due to their culture, belief, geographical location, and poor economic condition. The World Health Organisation (WHO) has estimated that today around 80% of the earth's population is dependent on traditional remedies for the medicinal needs. Numerous orchid species are used as herbal medicines, throughout the world. However, studies have not been carried out so far to check the ethnomedicinal value of epiphytic orchids in tea garden area of Terai region in West Bengal. Hence, present study has been carried out to assess the

- i) ethnomedicinal importance of epiphytic orchids; and
- ii) use of plant parts as medicine.

Material and Methods

Study Area and Surveys

The Terai region of West Bengal (India) is situated in the foot hills of Himalaya. This region of West Bengal is located between 25°57'N latitudes and 89°54'E longitudes. The Terai area has a pleasant climate with average temperature (28.1°C) and rainfall (3000 mm). It has a diversified vegetation including orchids, which helps the people to get food, fodder, fuel, timber, medicine, and house building etc.

Presently, the field survey was carried out in 14 different tea gardens (New Chamta, Sannayasithan, Singhia Jhora, Kiran Chandra, Naxalbari, Vijoy Nagar, Atal, Hansqua, Gangaram, Dagapur, Sukna, Kamalpur, Gulma, and Mohorgaon) of Terai region of West Bengal, India during January 2018 - October, 2021. Amongst these tea gardens, New Chamta tea garden is the first tea garden in Terai region (Ghosh and Das, 2018). These tea gardens have been selected randomly from different sites of Terai region.

Sampling, Identification, and Data Analysis

During the field survey, the sample of the each epiphytic orchid was collected from selected tea garden of Terai

Table 1. Ethnomedicinal uses of orchids in the Terai region of West Bengal, India.

Orchid species	Habitat	Used plant part	Preparation and uses
<i>Acampe praemorsa</i> (Roxb.) Blatt & McCann	Epiphytic	Root	Paste prepared from the fresh root is used to treat rheumatism
		Leaf	Paste prepared from the fresh leaves is used to treat cuts and wounds and to control acidity of stomach
<i>Aerides multiflora</i> Roxb.	Epiphytic	Leaf	Paste prepared from the fresh leaves is used to treat cuts and wounds
		Flower	Paste of fresh flower is used on face to treat skin diseases
<i>A. odorata</i> Lour.	Epiphytic	Root	Root paste is used to heal bone joints and pain
		Leaf	Paste of leaves is used to treat cuts and wounds Juice of the leaves is used to cure tuberculosis
		Flower	Useful in treating headache
<i>Bulbophyllum crassipes</i> Hook.f.	Epiphytic	Pseudobulb	1 to 3 raw pseudobulbs are eaten empty stomach to control acidity of stomach and as tonic also
<i>Cymbidium aloifolium</i> (L.) Sw.	Epiphytic	Root	Paste of root is used to set fractures and dislocated bones Root powder is eaten with saline water to control diarrhoea
<i>C. bicolor</i> Lindl.	Epiphytic	Root	Root paste is used to set fractures and dislocated bones
<i>Dendrobium aphyllum</i> (Roxb.) C.E.C Fisch.	Epiphytic	Leaf	Juice of leaf is applied to control earache
		Stem	Paste of the stem is used to set fractured bones
<i>Luisia trichorrhiza</i> (Hook.) Blume	Epiphytic	Leaf	Paste of leaves is used on muscles (externally) to relieve muscular pains
<i>L. filiformis</i> Hook.f.	Epiphytic	Whole plant	Paste of leaves and stem is used to set fractured bones
<i>Papilionanthe teres</i> (Roxb.) Schltr.	Epiphytic	Leaf	Leaf juice is used to control bleeding from nose
		Whole plant	Paste of whole plant is used to set dislocated bones
<i>Rhynchostylis retusa</i> (L.) Blume	Epiphytic	Root	Paste of root is used to control rheumatic pain Root powder is taken with warm water to cure asthma and tuberculosis
		Leaf	Paste of leaf is used to control rheumatic pain
		Flower	Paste of flowers is use on face to prevent skin disease
<i>Smitinandia micrantha</i> (Lindl.) Holttum	Epiphytic	Root	Fresh root is eaten and used as a tonic

region for identification. The orchid species were identified with the consultation of relevant literature (Gogoi, 2017; Gogoi *et al.*, 2012; Jalal, 2012; King and Pantling, 1898; Misra, 2012; Pradhan, 1979; Rahamatulla *et al.*, 2020a,b; Rao, 2009; Singh *et al.*, 2019). Informative data about ethnomedicine was collected by taking interviews of the local people of *Oraon* and *Kharia* community in randomly selected tea

gardens of Terai region. The collected data was analysed using statistics.

Fidelity Level (FI)

Fidelity level expresses relative healing potential of a medicinal plant and it was calculated by the formula:

$$FI (\%) = (Ip/Iu) \times 100$$

Table 2. Fidelity level of medicinal orchids used by tribal community.

Orchid species	Medicinal use in following major diseases	Number of resource persons (lp)	Total number of resource persons (lu)	Fidelity level (FI%)
<i>Acampe praemorsa</i> (Roxb.) Blatt & McCann	Rheumatic pain	5	8	62.50
<i>Aerides multiflora</i> Roxb.	Cuts and wounds	6	9	66.66
<i>A. odorata</i> Lour.	Joint pains	4	7	57.14
<i>Bulbophyllum crassipes</i> Hook.f.	Acidity of stomach	13	13	100
<i>Cymbidium aloifolium</i> (L.) Sw.	Diarrhoea	9	11	81.81
<i>C. bicolor</i> Lindl.	Dislocated bones	3	5	60
<i>Dendrobium aphyllum</i> (Roxb.) C.E.C Fisch.	Earache	9	10	90
<i>Luisia trichorrhiza</i> (Hook.) Blume	Muscular pain	5	7	71.42
<i>L. filiformis</i> Hook.f.	Fractured bones	3	5	60
<i>Papilionanthe teres</i> (Roxb.) Schltr.	Bleeding from nose	6	8	75
<i>Rhynchostylis retusa</i> (L.) Blume	Asthma	9	10	90
<i>Smitinandia micrantha</i> (Lindl.) Holttum	Weakness	4	6	66.66

where, lp is the number of resource persons who have independently given information about the use of medicinal plant species (Orchid plant species) for the same disease and lu is total number of resource persons who have given information about same medicinal plant species to control disease (Alexiades, 1996).

Results

During the present field study in selected 14 tea garden of Terai region (West Bengal, India), 12 species in 9 genera (*Acampe praemorsa*, *Aerides multiflora*, *A. odorata*, *Bulbophyllum crassipes*, *Cymbidium aloifolium*, *C. bicolor*, *Dendrobium aphyllum*, *Luisia trichorrhiza*, *L. filiformis*, *Papilionanthe teres*, *Rhynchostylis retusa*, and *Smitinandia micrantha*) were recorded which were epiphytic in habit (Table 1; Fig. 1A-L).

A total of eighteen tribal people were interviewed [7 males and 2 females (*Oraon* community) and 7 males and 2 females (*Kharia* community)]. The age group of the resource persons was between 40 years to 75 years. *Oraon* and *Kharia* tribal communities had ethnomedicinal knowledge in the tea gardens of Terai region (Fig. 1M-N); Male resource persons were however, dominant as compared to female resource persons.

Different plant parts such as, root (6 species), leaf (7 species), pseudobulb/or stem (2 species), flower (3 species), and whole plant (2 species) were found to be used for medicinal purpose (Fig. 2). Maximum people used leaf of epiphytic orchids as a medicine. Minimum

people used whole plant and pseudobulb/or stem to cure different diseases. These epiphytic orchids were observed as useful to treat different diseases like, diarrhoea, dislocated bones, fractured bones, rheumatic pains, bleeding of nose, earache, asthma, skin diseases, muscular pains, cuts and wounds etc.

More fidelity level of epiphytic orchid plants was recorded in this region. Cent per cent fidelity value was recorded in *Bulbophyllum crassipes*. Remarkable fidelity value i.e. (90) was found in *Dendrobium aphyllum* and *Rhynchostylis retusa*. *Cymbidium aloifolium* and *Papilionanthe teres* had fidelity value, respectively. Minimum fidelity level (57.14) was observed for *Aerides odorata* (Table 2).

Discussion

During the present investigation, cent per cent fidelity value was recorded in *Bulbophyllum crassipes* and minimum fidelity level (57.14) was observed in *Aerides odorata* (Table 2). Rahamatulla *et al.* (2020a) recorded a fidelity level of 12 orchid species; the orchids namely *Bulbophyllum leopardinum*, *Coelogyne ochracea*, and *Dendrobium aphyllum*, were found with highest fidelity value and *D. transparens* had the lowest fidelity value. The medicinally important shade trees (phorophytes) of the tea gardens can play a vital role to conserve these species. The entire family Orchidaceae is now included in Appendix-II of Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) as potentially threatened or endangered



Fig. 1. A-N. Epiphytic orchids with ethnomedicinal value in foot hills of Himalaya in tea garden area of Terai region, West Bengal: A, *Acampe praemorsa*; B, *Aerides multiflora*; C, *A. odorata*; D, *Bulbophyllum crassipes*; E, *Cymbidium aloifolium*; F, *C. bicolor*; G, *Dendrobium aphyllum*; H, *Luisia trichorrhiza*; I, *L. filiformis*; J, *Papilionanthe teres*; K, *Rhynchostylis retusa*; L, *Smitinandia micrantha*; M, Oraon person having a plant part of a medicinal epiphytic orchid; N, Kharia person with collection of epiphytic orchids with medicinal uses.

species in the natural habitat, where trade of wild orchids in national and international market for commercial use is strictly prohibited (Hegde, 2012; Pant, 2013). Most of the epiphytic orchid species are facing threats in the tea garden region of Terai (West Bengal, India) due to deforestation of old shade trees and lopping. Hence, epiphytic orchid friendly shade

trees should be planted in large number in the tea garden, which will be helpful to grow the epiphytic orchids under *ex-situ* condition. Tea gardens may prove as an *ex-situ* conservation site for growing epiphytic orchid species in this region. Further, *in vitro* propagation is an urgent need for mass propagation of these epiphytic orchid species and some propagation

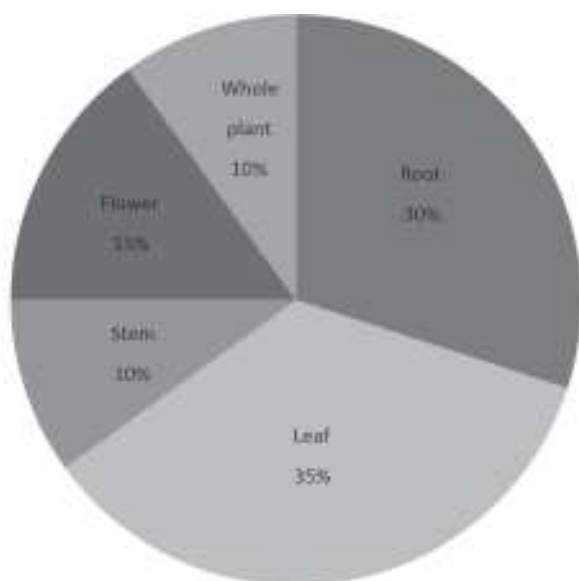


Fig. 2. Ethnomedicinal uses of plant parts of orchids in selected tea gardens of Terai region.

protocols are available (Anuprabha and Pathak, 2019; Bhowmik and Rahman, 2020; Gurudeva, 2019; Kaur and Pathak, 2014; Lekshmi and Decruse, 2018; Madhavi and Shankar, 2019; Mohanty and Salam, 2017; Thakur and Pathak, 2020), which will aid to maintain and propagate important orchid species for further conservation purpose. At the same time, there is also an urgent need to create awareness regarding this important orchid genetic resource amongst the people of the tea garden region of Terai in West Bengal, India and educate them regarding conservation strategies.

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References

- Alexiades, M. N. 1996. Collecting ethnobotanical data: An introduction to basic concepts and techniques. In: *Selected Guidelines for Ethnobotanical Research: A Field Manual*. Pp. 53-94. The New York Botanical Garden Press, New York, U.S.A.
- Anuprabha and Promila Pathak. 2019. *In vitro* asymbiotic seed germination and seedling development in *Coelogyne fimbriata* Lindl. *J. Orchid Soc. India*, **33**: 83-89.
- Bhowmik, Tapash Kumar and Md Mahhuhur Rahman. 2020. *In vitro* seed germination and micropropagation of *Dendrobium chrysotoxum* Lindl. (Golden Bow): A highly fragrant orchid species of Bangladesh. *J. Orchid Soc. India*, **34**: 69-77.
- Ghosh, C. and A. P. Das. 2018. Tea cultivation in the Indian Himalayan region. In: *Plant Diversity in the Himalaya Hotspot Region* Vol. II. (eds. A. P. Das and S. Bera). Bishen Singh Mahendra Pal Singh, Dehradun, India.
- Gogoi, K., R. F. Borah, G. C. Sharma, and R. Yonzone. 2012. Present status of orchid species diversity resources and distribution in Dibrugarh District of Assam of North East India. *Inter. J. Modern Bot.*, **2**(2): 19-33.
- Gurudeva, M. R. 2019. *In vitro* seed germination and developmental morphology of seedlings in *Dendrobium ovatum* (L.) Kraezl. *J. Orchid Soc. India*, **33**: 31-41
- Hegde, S. N. 2012. *Ex situ* and *In situ* conservation of orchids in India. *J. Orchid Soc. India*. **26**(1-2): 1-4.
- Jalal, J. S. 2012. Status, threats and conservation strategies for orchids of Western Himalaya, India. *J. Threat. Taxa*, **4**(15): 3401-09.
- Kaur, S. and Promila Pathak. 2014. Synthetic seeds and *in vitro* propagation of *Cymbidium aloifolium* (Linn.) Sw. *J. Orchid Soc. India*, **28**:103-08.
- King, G. and R. Pantling. 1898. *The Orchids of Sikkim and North East Himalayas*. Bengal Secretariat Press, Calcutta, India.
- Lekshmi, S. and S. W. Decruse. 2018. *In vitro* symbiotic seed germination of *Vanda spathulata* (L.) Spreng., A vulnerable orchid of Western Ghats. *J. Orchid Soc. India*, **32**: 113-19.
- Madhavi, M. and P. C. Shankar. 2019. Effect of different growth additives on seed germination of *Vanda tessellata* (Roxb.) Hook. ex G. Don- A medicinal orchid. *J. Orchid Soc. India*, **33**: 105-12.
- Misra, S. 2019. *Orchids of India- A Hand Book*. Bishen Singh Mahendra Pal Singh, Dehradun, India.
- Mohanty, C. R. and Priyadarsini Salam. 2017. *In vitro* seed culture studies in *Dendrobium* orchid CV. Banyat Pink. *J. Orchid Soc. India*, **31**: 93-96.
- Pradhan, U. C. 1979. *Indian Orchids Guide to Identification and Culture*. Vol. II. Premulance Books, Kalimpong, India.
- Rahamtulla, M., V. Rampilla, and S. K. Khasim. 2020a. Distribution and Ethnomedicinal Importance of Orchids of Darjeeling. *Indian Forester*, **146**(8): 715-21.
- Rahamtulla, M., A. K. Roy, and S. M. Khasim. 2020b. Orchid iversity in Darjeeling Himalaya, India: Present Status and Conservation. In: *Orchid Biology: Recent Trends & Challenges* (eds. S. M. Khasim, S. N. Hegde, M. T. González-Arno, and K. Thammassiri) pp. 155-188. Springer Nature Singapore Pte Ltd, Singapore.
- Rao, A. N. 2009. Monopodial orchids of Arunachal Pradesh (India)- Classification, taxonomy, distribution and conservation. *Bull. Arunachal Forest Res.*, **25**: 55-92.
- Singh, S. K., D. K. Agrawala, J. S. Jalal, S. S. Dash, A. A. Mao, and P. Singh. 2019. *Orchids of India: A Pictorial Guide*. Botanical Survey of India, Kolkata, India.
- Thakur, Babita and Promila Pathak. 2020. *In vitro* propagation of *Herminium lanceum* (Thunb. ex Sw.) Vuijk (Orchidaceae), through asymbiotic seed germination: A therapeutically important and endangered orchid from NorthWestern Himalayas. *J. Orchid Soc. India*, **34**: 61-67.
- Yonzone, R., D. Lama, R. B. Bhujel, and S. Rai. 2012. Orchid species diversity of Darjeeling Himalaya of India. *International J. Pharm. Life Sci.*, **3**(3): 1533-50.