



IMPORTANCE OF *DIPLAZIUM ESCULENTUM* (RETZ.) SW. (ATHYRIACEAE) ON THE LIVES OF LOCAL ETHNIC COMMUNITIES IN TERAI AND DUARS OF WEST BENGAL -A REPORT

Baishakhi Sarkar¹, Mridushree Basak¹, Monoranjan Chowdhury^{1*} and A. P. Das²

^{1*}Taxonomy of Angiosperms and Biosystematics Laboratory, Department of Botany, University of North Bengal, Siliguri-734013 (West Bengal) India

²Department of Botany, Rajiv Gandhi University, Itanagar (Arunachal Pradesh), India

Abstract

Diplazium esculentum (Retz.) Sw. or 'Dheki Shak' is used as a nutritive leafy vegetable by the local communities of Terai and Duars parts of West Bengal. From our study and previous literatures it was found of having very important ethnobotanical value. The people of lower socio-economic communities rely mainly upon the collection and selling of this plant during the summer and monsoon season in the study area. The step wise photographs from field to market are represented here along with the ethnobotanical uses by different communities across India.

Key words: *Diplazium esculentum*, Terai and Duars, vegetable, ethnic Communities.

Introduction

There are many naturally growing plant species which are eaten by the local people and even marketed locally but are never cultivated. These are referred as Wild Edible Plants (WEP) (Beluhan *et al.*, 2010). These plants are often found in abundance and the people of different cultures and tribes collect these as source of nutrition, medicine etc. Several investigations suggest that sometimes these plants possess more nutritional values than the conventional crops (Grivetti *et al.*, 2000). At the same time these do not carry the adverse effects of fertilizers and pesticides used rampantly in our crop fields.

The northern part of West Bengal, lying just at the feet of the Eastern Himalaya is known as Terai and Duars and forms a part of the Himalaya Biodiversity Hotspot which is quite rich in floral diversity (Das *et al.*, 2010; Rai and Das, 2008; Shukla *et al.*, 2013; Chowdhury, 2015). Due to the prevalence of highly moist and warm climatic conditions for major part of the year, wide variety of plants, including fern and fern allies are growing in abundance in this area. One of the most common fern

Diplazium esculentum (Retz.) Sw. (commonly called vegetable fern) of family Athyriaceae is abundant in open moist herb land vegetation and the partially open young and circinate coiled fronds of this plant are regularly consumed by local people as a nutritive leafy vegetable. It is known as 'Dhekishak' by Bengalee (Sen and Ghosh, 2011; Panda, 2015), 'Paloi' in Hindi (Panda, 2015), 'Dhekia' by Assamese and 'Okang' by Manipuris (Kutum, *et al.* 2011), 'Sikiomamoidu' or 'Maikhandu' by Tripuris (Shil and Choudhury, 2009) etc. Some local people from the lower socio-economic communities collect it in large quantities from the wild regularly and marketed locally and sometime sent to distant markets like in Kolkata. So, this naturally growing fern is a regular source of earning livelihood for these poor local and ethnic peoples except during winter when this species shows very limited growth. The Table 1 presents the uses of this plant as recorded by different workers including Namsa *et al.* (2011), Kagyung *et al.* (2010) and Pegu *et al.* (2013).

The present study aims to represent the detailed ethnobotanical importance of *Diplazium esculentum* (Retz.) Sw. (Athyriaceae) and its local marketability.

*Author for correspondence : E-mail : mono_malda@yahoo.co.in

Materials & Methods

During the period of March–July, 2017, a survey was conducted in the Terai and Duars parts of North Bengal. Entire data was collected from the local people who are engaged in its harvest and marketing through discussion using a structured questionnaire. Some collectors were selected from different regions of North Bengal and thoroughly interviewed. The questionnaire was prepared to know all the steps from the collection to marketing and the total process was photographed following the modified method of Chowdhury (2012).

Result & discussion

Instead of all hazards, the harvestors/ gatherers go out routinely to collect this wild vegetable from thick vegetation, mainly the moist herblands, during early summer to late monsoon as this is the most active growth season for the species. They generally collect about 7-

10 kg plants every day. After this season, the amount of harvest and the quality drop drastically. After collection they find out one open space, take out the entire harvest generally on a spreading polythene sheet or on matted grasses, clean the materials from the mixed-up twigs of other plants, snails, leeches etc. and made into small ‘mutha’ (*i.e.* bundles). For binding, they generally use paddy-straw, dry leaf-sheaths of banana plants or grasses. Then the bundles are taken to neighborhood market or ‘Haat’ or directly to consumers. Sometimes, they directly sell it to passer-by just sitting on the roadside, again, sometimes there are middle-men or a second person to take the material from the collector to the market. The cost varies from 2 to 4 bundles for Rs. 10 in different markets within the study area. During the collection of *D. esculentum* fronds, they also collect some other edible plant parts like the flower buds of *Colocasia esculentum* and sell these together (PLATE I).



Plate: 1. Making of ‘Mutha’ by a seller 2. Young frond (edible stage) of *Diplazium esculentum* 3. Mature frond of *Diplazium esculentum* 4. Selling of *Colocasia esculentum* flower bud along with *Diplazium esculentum* 5. Direct selling of *Diplazium esculentum* to passers-by by the Collector herself 6. Selling of *Diplazium esculentum* fronds in a local market

Table 1: Uses of *Diplazium esculentum* (Athryiaceae) by different communities across India.

Community	Place	Parts used	Uses	Reference
<i>Mishing, Bodo, Sonowal Kachari, Rabha</i>	Poba Reserve Forest, Assam	Leaves, whole plant, rhizome	Tender leaves are cooked along with fruits of <i>Dillenia indica</i> and fish and consumed as vegetable; whole plant used as insecticides; decoction of rhizome used for haemoptysis and cough	Pegu <i>et. al.</i> , 2013
<i>Santal, Kol, Bhumija, Bhuyan, Mahalis, Sounti, Saharas</i>	Simlipal Biosphere Reserve, Orissa	Root	20 gm fresh root is boiled in 1litre water till the volume reduced to 1/4 th of the volume. 3ml of this decoction is taken with 2 ml honey for the cure of spermatorrhea	Rout <i>et. al.</i> , 2009
<i>Mishing</i>	Kaziranga National Park, Assam	Leaves	Used as vegetable, used essentially in the religious ceremony of the dead persons	Kutum <i>et. al.</i> , 2011
<i>Bharia, Gond</i>	Madhya Pradesh	Rhizome	Used as tonic	Rai, 1987
<i>H'mar, Jainitia, Riang, Chorai, Hrangkhoh, Mizo, Vaiphei paitte, Karbi, Naga and Kuki</i>	Cachar district, Assam	Young fronds	Used as vegetable, which stimulates digestion	Das <i>et. al.</i> , 2008
<i>Meiteis, Nagas, Kukis</i>	Manipur	Young fronds	Young fronds taken as vegetable	Yumkham, 2011
<i>Murrah, Bhumij, Santal, Bagti, Koll</i>	Assam	Young fronds	Young fronds taken as vegetable	Sen and Ghosh, 2011
<i>Todas, Kotas, Kurumbas, Irulas, Panyas, Kattunayakas</i>	Western Nilgiris, Tamil Nadu	Fronds	Raw young fronds are taken as vegetable, also cooked	Ramachandran and Udhayavani, 2013
<i>Rabha</i>	Assam	Tender leaves	Boiled and fried leaves are eaten as vegetable	Das and Teron, 2014
<i>Reang</i>	Tripura	Young fronds	Boiled with salt and taken to maintain good health	Shil and Choudhury, 2009
<i>Adi</i>	Arunachal Pradesh	Young frond	Boiled fronds are used in treatment of laxative	Kagyung <i>et. al.</i> , 2009

Beside, providing the basic needs, this fern have got considerable anti-inflammatory and anti-hepatoprotective activities (Nair *et al.*, 2015) and also significant cytotoxic, anti-microbial, antioxidant properties (Akter *et al.*, 2014). However, a study revealed, even after cooking, this fern may induce infertility to the male reproductive system (Roy and Choudhuri, 2015). Another study reported that daily consumption of the fern was found to elevate the risk of esophageal cancer (Somvanshi *et al.*, 2006).

Conclusion:

It is observed from our study that, *Diplazium esculentum* is having diversified uses. Even though it is marketed regularly by the local ethnic people and directly related with their socio-economic condition, there is no record for its cultivation. Therefore, it is suggested that it should be cultivated for its high demand to safeguard the natural vegetation.

Acknowledgement:

The authors are grateful to UGC, New Delhi for financial support.

References

Akter, S., M.M. Hossain, I. Ara and P. Akhter (2014). Investigation of In vitro antioxidant, antimicrobial and cytotoxic activity of *Diplazium esculentum*. *Int. J. Adv. Pharm. Biol. Chem.*, **3(3)**: 723- 733.

Beluhan, S. and A. Ranogajec (2010). Chemical composition and non-volatile components of Crotil wild edible mushrooms. *Food Chem.*, **124**: 1076- 1082.

Chowdhury, A. (2015). Studies on the diversity and ethnic uses of wetland vascular plants in Terai & Duars of West Bengal, India. Ph. D. Thesis.

Chowdhury, M. (2012). Chokoth a traditional alcoholic drink of rabha tribe in India. *Lif. Sc. Leaflet.*, **4**: 54- 59.

Das, A.K., B.K. Dutta and G.D. Sharma (2008). Medicinal plants used by different tribes of Cachar district, Assam. *Ind. J. Trad. Knowl.*, **4(3)**: 446- 454.

Das, A.P., C. Ghosh, A. Sarkar, R. Biswas, K. Biswas, D. Chowdhury, A. Lama, S.

- Moktan and A. Chowdhury (2010). Preliminary report on the Medicinal Plants from three MPCAs in Terai and Duars of West Bengal, India. *Pleione*, **4(1)**: 90- 101.
- Das, C. and R. Teron (2014). Ethnobotanical notes of the Rabha community in Mataikhar reserve forest of Kamrup district, Assam, India. *Res. J. Rec. Sci.*, **3(6)**: 26- 33.
- Grivetti, L.E. and B.M. Ogle (2000). Value of traditional foods in meeting macro- and micronutrient needs: the wild plant connection. *Nutr. Res. Rev.*, **13**: 31- 46.
- Kagyung, R., P.R. Gajurel, P. Rethy and B. Singh (2010). Ethnomedicinal plants used for gastro-intestinal diseases by Adi tribes of Dehang- Debang Biosphere reserve in Arunachal Pradesh. *Ind. J. Trad. Knowl.*, **9(3)**: 496- 501.
- Kutum, A, R. Sarmah and D. Hazarika (2011). An ethobotanical study of Mishing tribe living in fringe villages of Kaziranga National Park of Assam, India. *Ind. J. Fund. Appl. Lif. Sci.*, **1(4)**: 45- 61.
- Nair, A. G., G.S. Nikhila, G. Sangeeta and T.S. Swapna (2015). In vitro hepatoprotective and anti- inflammatory activities of *Diplazium esculentum* (Retz.) Sw.- A wild fern from western ghats. *Int. J. Insti. Pharm. Lif. Sci.*, **5(2)**: 341- 348.
- Namsa, N.D., M. Mandal, S. Tangjang and S.C. Mandal (2011). Ethnobotany of the Monpa ethnic group at Arunachal Pradesh, India. *J. Ethnobiol. Ethnomed*, **7**: 1- 14.
- Panda, S. (2015). A study on leaves and fronds consumed as vegetable and salads in West Bengal, India. *Int. J. Adv. Pharm. Biol. Chem.*, **4(3)**: 685- 695.
- Pegu, R., J. Gogoi, A.K. Tamuli and R. Teron (2013). Ethnobotanical study of Wild Edible Plants in Poba Reserved Forest, Assam, India: Multiple Functions and Implications for Conservation. *Res. J. Agr. Fores. Sci.*, **1(3)**: 1- 10.
- Rai, M. K. (1987). Ethno- medical studies of Patalkot and Tamiya (Distt. Chhindwara) M. P. – Plants used as tonic. *Anc. Sci. Lif.*, **7(2)**: 119- 121.
- Rai, U. and A.P. Das (2008). Diversity of Trees in the Darjiling Foothill Region of Eastern Himalaya. *NBU J. Pl. Sci.*, **2**: 39- 57.
- Ramachandran, V.S. and C. Udhayavani (2013). Knowledge and uses of wild edible plants by Paniyas and Kurumbas of Western Nilgiris, Tamil Nadu. *Ind. J. Nat. Prod. Res.*, **4(4)**: 412-418.
- Rout, S.D., T. Panda and N. Mishra (2009). Ethnomedicinal studies on some Pteridophytes of Simmlipal Biosphere Reserve, Orissa, India. *Int. J. Med. Medic. Sci.*, **1(5)**: 192- 197.
- Roy, S. and T.K. Choudhuri (2015). Toxicological assessment of *Diplazium esculentum* on the reproductive functions of male Swiss albino mouse. *Dr. Chem. Toxicol.* **40(2)**: 171-182.
- Sen, A. and P.D. Ghosh (2011). A note on the ethnobotanical studies of some pteridophytes in Assam. *Ind. J. Trad. Knowl.*, **10(2)**: 292- 295.
- Shil, S. and M.D. Choudhury (2009). Ethnomedicinal importance of Pteridophytes used by Reang tribe of Tripura, North East India. *Ethnobot. Leafl.*, **13**: 634- 643.
- Shukla, G, R. Biswas, A.P. Das and S. Chakravarty (2013). Visual qualitative description of a humid tropical foothill forest in Indian eastern Himalayas. *Biodiversity*, **14(3)**: 133- 146.
- Somvanshi, R., D.R. Lauren, B.L. Smith, R.K. Dawra, O.P. Sharma, V.K. Sharma, A.K. Singh and N.K. Gangwar (2006). Estimation of the fern toxin, ptaquiloside, in certain Indian ferns other than bracken. *Curr. Sci.*, **91(11)**: 1547- 1552.
- Yumkham, S.D. and P.K. Singh (2011). Less known ferns and fern- allies of Manipur with ethnobotanic uses. *Ind. J. Trad. Knowl.*, **10(2)**: 287- 291.