



QUALITATIVE ANALYSIS OF FREE AMINO ACIDS OF SOME PTERIDOPHYTES WITH SPECIAL REFERENCE TO THEIR ETHNOMEDICINAL USES IN WEST BENGAL, INDIA

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ABSTRACT

The paper highlights the study of qualitative analysis of free amino acids of some pteridophytes. The qualitative analysis of free amino acids also analyzed by the TLC to identified the different types of amino acids. The study also focuses on the ethnominicinal importance of selected pteridophytes used by ethnic people of West Bengal.

KEY WORDS: - Free amino acids, TLC, ethnominicinal importance.

INTRODUCTION

The Pteridophytes, originated in the Silurian period (above 350 million years ago), was abundant during the carboniferous period but declined later. Today Pteridophytes (Ferns and Lycophytes) has found largely in mountainous regions and moist, cool and shady places. In the recent years the biochemical data also play an important role in characterization and determination of inter specific relationship among the taxa (Mondal & Mondal, 2002). The qualitative analysis also plays the vital role. The qualitative analysis of free amino acids was also analyzed by TLC (Thin layer chromatography) to identified the different types of amino acids. Although the medicinal value of the pteridophytes have been known to man for more than 2000 years, compared to the angiosperms. The Greek botanist Theophrastus (Ca.372-287 B.C.) had referred to the medical value of pteridophytes in one of his books. The pteridophytes plants plays significant role on the ethnominicinal point of view. In ancient Indian medicine several pteridophytes were used. Several pteridophytes have been used by unani physicians in India and Western Asia. The pteridophytes are found which has ethnominicinally important and used by the local and tribal people. The pteridophytes show various economic values towards food and fodder indicators, biofertilizers, insect repellents, medicine and folk medicines (Ghosh *et al.*, 2004). The present papers deals with the original information on, qualitative analysis of free amino acids of leaves and ethnominicinal uses of pteridophytes collected from Gangetic delta of West Bengal, India.

MATERIALS AND METHODS

The plant materials were collected from different part of West Bengal for qualitative analysis of free amino acids were subjected to one dimensional Thin Layer Chromatography (TLC) according to the method described by Sadasivam and Manickam (1996). De-Alufolien Kieselgel 60 aluminium sheets (merck) were used for

TLC. The amino acids were chromatographed using n-butanol : acetic acid : water (80:20:20 v/v) as eluant and 0.1% ninhydrin in acetone as spraying agent. To quantify the amount of amino acid in each spot, the samples were chromatographed on sheets under conditions. The sheets were sprayed with ninhydrin to identify the spots. The present data is outcome of field research carried out as part of ethnominicinal studies. Ethnominicinal data was collected from rural and tribal people of West Bengal and as well as from literature studied.

RESULT AND DISCUSSION

The study of qualitative analysis of free amino acids was analyzed by TLC (Fig-1) to identify the amino acids composition however shows a very interesting features. Not only was there an increase in the total free amino acids content, the concentration of individual amino acids in the free state also varied. The study of the biochemical (qualitative) analysis of the leaf-glands of eight species of pteridophytes gives us an identical view of their free amino acids nature which can play the vital role in characterization and determination of their inter-relationship among the taxa. The free amino acids in the leaf-glands of pteridophytes shows several types of amino acids such as DL-aspartic acid, DL-methionine, DL-valine, L-tyrosine etc. Some amino acids are non-identified in our study. The study shows that DL-methionine is the common free amino acid of *Pteris vittata*, *Drynaria quercifolia*, *Ampelopteris prolifera*, *Dryopteris filix-mas*. L-tyrosine monohydrochloride are the common of *D. filix-mas* and *Selaginella indica*. Another free amino acid L-arginine monohydrochloride is also common in *D. quercifolia*, *Ceratopteris thalictroides* and *Marsilea quadrifolia*. Glycine is the only amino acid which is found in the *Helminthostachys zeylanica*. The all identified amino acids are given in the table 1.

Information on the ethnominicinal utility of pteridophytes plants clearly indicated that the pteridophytes are of

immense ethnomedicinal importance and there is a great need for their exploitation towards the ethnomedicinal

utility in daily life. Some of the aspects of ethnomedicinal importance of pteridophytes are as follows:

TABLE-1: Identified free amino acids of selected Pteridophytes

Sl. No.	Name of the Plant Species	Identified free amino acids
1	<i>Pteris vittata</i>	DL – aspartic acid ; DL – methionine, 3-unknown
2	<i>Drynaria quercifolia</i>	L- arginine monohydrochloride; DL- Serine ; DL-methionine; L – Leucine; 3-unknown
3	<i>Ampelopteris proliferata</i>	DL-Serine ; DL – methionine; 2-unknown
4	<i>Ceratopteris thalictroides</i>	L- arginine monohydrochloride; L – hydroxyproline ; L – glutamic acid; DL – Valine ; L – Tyrosine ; 1 – unknown
5	<i>Marsilea quadrifolia</i>	L – arginine monohydrochloride; DL-β Phenylalanine; 5 – unknown
6	<i>Dryopteris filix-mas</i>	L-cystine monohydrochloride; DL-methionine ; DL-Tryptophan;
7	<i>Selaginella indica</i>	L-Cystine monohydroxychloride; L-glutamic acid; DL-Dopa; L-Tyrosine.
8	<i>Helminthostachys zeylanica</i>	Glycine; 4- unknown



FIGURE 1: The Schematic representation of the amino acids (TLC plate) composition of the Leaves of some selected Pteridophytes (A- *Pteris vittata* B- *Drynaria quercifolia* C- *Ampelopteris proliferata* D- *Ceratopteris thalictroides* E- *Marsilea quadrifolia* F- *Dryopteris filix-mas* G- *Selaginella indica* H- *Helminthostachys zeylanica*).

- ***Pteris vittata* L. :-[Fig-2]**
 - i) Plant extract is used as demulcent, hypotensive, tonic, antiviral and antibacterial.
 - ii) This plant is used to absorb arsenic from the soil (Ghosh et al. 2004).
 - iii) Herb juice used for diarrhea and dysentery.



Fig-2: Plant picture of *Pteris vittata*.

- ***Drynaria quercifolia* J. Sm. :-[Fig-3]**
 - i) The rhizome is bitter, tonic, astringent to the bowels.
 - ii) It is used in typhoid fever and in treatment of phthisis, dyspepsia and cough (Mitra, 2006).



Fig-3: Plant picture of *Drynaria quercifolia*.

- ***Ampelopteris prolifera* (Ketz.) cop. :- [Fig-4]**
- i) Young or tender fronds are sold in the market as “dheki shaak” in India and Bangladesh.
- ii) It is also used as possesses antibiotic substances (Rao,2006).
- iii) Occasionally cultivated as an ornamental plant in gardens.



Fig-4: Plant picture of *Ampelopteris prolifera*.

- ***Ceratopteris thalictroides* (L) Brongn :- [Fig-5&5(2)]**
- i) Fronds are used as poultice in skin disease; reported to be toxic and styptic.
- ii) Leaf powder along with turmeric is applied to unhealed wounds.



Fig-5: Plant picture of *Ceratopteris thalictroides*.

- ***Marsilea quadrifolia* Linn.:- [Fig-6]**
- i) Plants are used in cough, spastic condition of leg, muscles and insomnia.
- ii) It is also useful in diarrhoea, skin disease dyspepsia and fever.
- iii) Leaves are sold in the market as “Sushni shaak” for food vegetables.
- iv) In Santhal medicine mixed with other plants parts uses in impetigo, acute pain due to sores and perforation ulcers, in the palate.

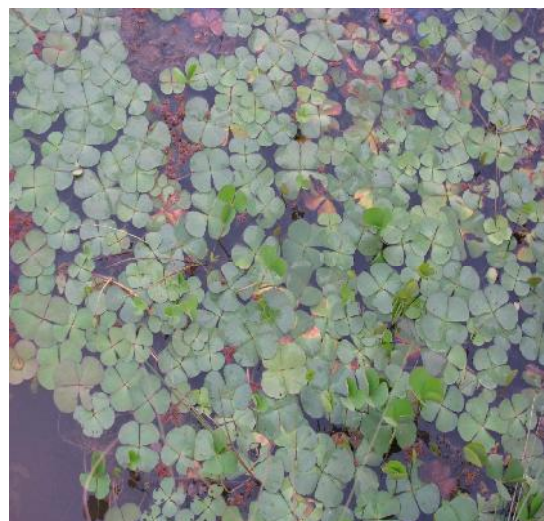


Fig-6: Plant picture of *Marsilea quadrifolia*.

- ***Dryopteris filix-mas* (L.) Schott :- [Fig-7]**
- i) It is one of the oldest anthelmintic drug known and has been used since ancient times for expelling worms from the intestines of man and animals (Mitra, 2006).
- ii) Now it one of the best taeniocidal drugs available and is administered in the form of a liquid extract of *D. filix-mas* (Mitra, 2006).



Fig-7: Plant picture of *Dryopteris filix-mas*.

- ***Selaginella indica* (Milde) Trayon :- [Fig-8]**
 - i) Plants are burnt in home for curing children's disease. (Rao et.al, 2006)
 - ii) It is also used for indigestion.
 - iii) Whole plant yields a medicine thus has some curative values for the liver diseases (Mandal & Mondal, 2008).



Fig-8: Plant picture of *Selaginella indica*.

- ***Helminthostachys zeylanica* (L.) Hook : [Fig-9]**
 - i) Rhizome used in sciatica. It's also considered as aperient (Mitra, 2006).
 - ii) Rhizome is used for whooping cough and also for dysentery, cataract and early stages of phthisis (Mandal and Mondal, 2011).



Fig- 9: Plant picture of *Helminthostachys zeylanica*.

CONCLUSION

The study of the qualitative analysis of free amino acids in the leaf-glands of pteridophytes shows several types of amino acids however shows a very interesting feature and which can be used molecular marker in taxonomic studies. Pteridophytes, "the fern and fern allies" as they are called are of great medicinal values. In addition to this, quite a number of them are as used as food, shelter and ornamentals and the pteridophyte have great role in ethnomedicinal purposes.

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* Original not consulted.

* *Theophrastus* (Ca. 372-287 B.C.)